ADDENDUM TO SITE ASSESSMENT REPORT PREPARED BY GDC ENGINEERING, INC. AND DATED AUGUST 31, 1994

MONITOR WELL INSTALLATION, MONITOR WELL PLUG AND ABANDONMENT, EASTERN OIL LAGOON IMPOUNDMENT SAMPLING, AND MONITOR WELL WATER LEVEL MEASUREMENT ADDENDUM PROJECT

Commonwealth Oil Refining Company
Petrochemical Complex
Peñuelas, Puerto Rico 00731

DSM Project No. 1019-01

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 EXECUTIVE SUMMARY

This addendum to the Site Assessment Report, written by GDC Engineering Inc. (GDC) and dated August 31, 1994, has been prepared for Commonwealth Oil Refining Company (CORCO) by DSM Environmental Services, Inc. (DSM) in order to document the installation of two monitor wells, the plugging and abandonment of two monitor wells, the collection of background soil samples at two locations, the sampling of soils at the Eastern Oil Lagoon Impoundment, the determination of sludge thickness within the Eastern Oil Lagoon Impoundment, and the measurement of water levels within eight (8) groundwater wells monitoring five (5) solid waste management units located at the CORCO Petrochemical Complex, Ponce, Puerto Rico (the Site).

The following conclusions can be drawn from the completion of this project:

- Groundwater analysis from monitor well PD-2 indicates that all volatile and semi-volatile organics, sulfide, cyanide, pesticides/PCB, chlorinated herbicides, and organo-phosphorus pesticides were not detected above the method detection limits for each parameter. Total heavy metals were detected at concentrations which are thought to reflect background levels within the silt considering the silty groundwater matrix. This conclusion is substantiated by a comparison with the dissolved metals sample which only detected Barium, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, and Zinc at low concentrations. Total Tetrachlorodibenzofuran and Total Pentachlorinated dibenzofuran were detected at a concentration of .11 and .04 ng/l, respectively. These concentrations are in the part per trillion range.

- The groundwater in the vicinity of the Eastern Oil Lagoon Impoundment is flowing to the south with a 6.47×10^{-3}ft/ft hydraulic gradient.

- The groundwater in the vicinity of the Eastern Cooling Water Lagoon Impoundment, Western Cooling Water Lagoon impoundment, Aeration Lagoon Impoundment, and Oxidation Lagoon Impoundment is flowing to the west southwest with a 9.07×10^{-4}ft/ft hydraulic gradient.

- Soil samples from within the Eastern Oil Lagoon Impoundment indicate that hydrocarbons have migrated vertically a minimum of one foot beneath the sludge layer overlying the impoundment. The minimum volume of in-situ sludge and hydrocarbon affected soil within the Eastern Oil Lagoon Impoundment is approximately 3,248 cubic yards.

2.0 INTRODUCTION

The original site assessment was implemented by GDC and Roy F. Weston (Weston) as an initial step to determine closure methodology for seven specified solid waste management units at the CORCO facility in Ponce, Puerto Rico. The addendum field work was performed by DSM for CORCO from September 29, 1994 through October 6, 1994 in order to fill data gaps presented by the original site assessment. The work performed by DSM entailed the installation of monitor wells, plug and abandonment of monitor wells, the collection of background soil samples at two locations, sampling of the Eastern Oil Lagoon Impoundment, and the measurement of water levels in eight (8) monitor wells located at the CORCO Petrochemical Complex, Ponce, Puerto Rico (the Site).

The overall objectives of the work performed by DSM were:

- to evaluate the soil conditions at two background monitor well locations;
- to plug and abandon two monitor wells which were defective;
- to replace two monitor wells which were defective;
- to determine the thickness of sludge present within the Eastern Oil Lagoon Impoundment in order to ascertain a rough order of magnitude sludge volume estimate;
- to collect samples of native soils beneath the sludge present within the Eastern Oil Lagoon Impoundment to determine a rough estimate of the vertical extent of petroleum hydrocarbons within the Eastern Oil Lagoon Impoundment as well as determine an estimate of the volume of hydrocarbon affected soils;
- to collect groundwater level data from eight (8) monitor wells in order to determine the potentiometric surface and hydraulic gradient of the area adjacent to the Eastern Cooling Water Lagoon Impoundment, Western Cooling Water Lagoon Impoundment, Aeration Lagoon Impoundment, Oxidation Lagoon Impoundment, and the Eastern Oil Lagoon Impoundment.

This addendum presents the procedures which were used to install two (2) monitor wells, plug and abandon two (2) monitor wells, develop an estimate of the volume of sludge within the Eastern Oil Lagoon Impoundment, sample soils at four locations within the Eastern Oil Lagoon Impoundment to ascertain an estimate of hydrocarbon affected soils, and measure groundwater levels at eight (8) monitor wells at the subject site.

3.0 MONITOR WELL INSTALLATION

On September 30, 1994, two (2) monitor wells were installed in the uppermost aquifer adjacent to the Eastern Oil Lagoon Impoundment (See **Figure 1**). Monitor well EL-1 was installed upgradient of the Eastern Oil Lagoon Impoundment in order to determine background concentrations of waste constituents in soil and groundwater. EL-2 was installed downgradient of the Eastern Oil Lagoon Impoundment in order to detect potential releases of waste constituents from the unit. Monitor wells EL-1 and EL-2 were installed to replace defective wells which were plugged and abandoned as described in Section 4.0 of this addendum.

A Mobile B-53 trailer-mounted drill rig equipped with 6.75-inch O.D. hollow stem augers was used to advance a borehole for the construction of monitor wells and for background soil sample collection. Each boring was sampled with a 2-foot long split spoon sampler, driven in advance of the auger according to ASTM (D-1586) Standard Penetration Test. Continuous soil samples were obtained from ground surface to the saturated zone, characterized, and screened with a Thermoenvironmental 580B Photoionization Detector. Geotechnical samples were collected at roughly five (5) foot intervals beneath the saturated zone only if downhole conditions were favorable for sample collection. PID readings were recorded on the monitor well construction diagrams which are included as **Figures 2 and 3**.

The lithology of the native soils encountered in boring EL-1, completed to a depth of 24.2 feet, consists of a thin veneer of humus, silty clays (CL), clayey silts (ML), and clayey very fine sand (SM) overlaying unconsolidated sands and fine and coarse gravelly sands (SP). The lithology of the soils encountered in boring EL-2, completed to a depth of 28.5 feet, consists of twelve feet of fill (tan calcareous clay with calcareous nodules), clays (CH), silty clays (CL), and sandy clays (CL) overlaying unconsolidated sands (SP). Field screening of soils with the PID did not detect any organic vapors within these borings located upgradient and downgradient of the Eastern Oil Lagoon Impoundment. Initial groundwater levels ranged between 7.5 and 20 feet below ground surface elevation at EL-1 and EL-2, respectively.

The well materials used to construct the wells were clean, two-inch diameter, flush-joint threaded PVC riser with a 20-foot long screen (0.010-inch slot) and a 6-inch long conically shaped bottom cap. A filter pack, consisting of pea gravel, was placed in the annulus to approximately two feet and five feet above the top of the screen in EL-1 and EL-2, respectively. Heaving sands were present in both EL-1 and EL-2. The formation sand is adjacent to the screen from a depth of 11.5 feet and 24.7 feet below ground surface elevation to total depth of the boring in EL-1 and EL-2, respectively. Approximately one-two feet of bentonite pellets were placed above the filter pack and allowed to hydrate prior to constructing the final monitor well completions. Well completions consisted of four-inch diameter steel protective casings with locking caps and four feet by four feet by six inch thick surface concrete pad.

Monitor wells EL-1 and EL-2 were developed after installation by personnel from Victor E. Rivera Associates. Five well volumes were removed from each well with the use of a bailer.

Temperature, pH, and specific conductivity were recorded after each well volume was removed. This data is presented in **Table 1**.

A monitor well was to have been installed upgradient of the Western Cooling Water Lagoon Area in order to collect background soil and groundwater samples for the Western Cooling Water Lagoon Impoundment, Eastern Cooling Water Lagoon Impoundment, Aeration Lagoon Impoundment, and Oxidation Lagoon Impoundment. A background monitor well was not installed at this location due to the presence of hydrocarbons.

Boring WL-5-1 was performed approximately 150 feet northeast of the northeastern bank of the Eastern Cooling Water Lagoon Impoundment (See **Figure 4**). Organic vapors were detected in the auger head space (57 ppm) and a strong smell of hydrocarbons were noted on a sample of native soil collected at a depth of 6 to 8 feet below ground surface (60 ppm PID reading). Since the purpose of this monitor well was to provide background analytical data for soil and groundwater unaffected by site operations, the boring was abandoned and grouted with a Portland cement and bentonite mixture (95%/5% by dry weight) hydrated with 3-4 gallons of water per 47 pound sack of cement.

Subsequently to abandoning boring WL-5-1, boring WL-5-2 was performed approximately 45 feet northeast of the northeastern bank of the Eastern Cooling Water Lagoon Impoundment (**See Figure 4**). Organic vapors were detected while performing the boring (60-88 PPM). The sample of native soil collected at a depth of 6 to 8 feet below ground surface elevation was saturated with hydrocarbons. This boring was therefore abandoned and grouted to total depth in the same manner as boring WL-5-1. Lithographic logs of WL-5-1 and WL-5-2 are included as **Figures 5 and 6**, respectively.

The decision was made to use monitor well PD-2, previously installed by DSM, as a background monitor well for the Eastern Cooling Water Lagoon Impoundment, Western Cooling Water Lagoon Impoundment, Aeration Lagoon Impoundment, and Oxidation Lagoon Impoundment. A boring was performed in order to collect soil samples for background determination adjacent to monitor well PD-2. This subject is discussed in the next section of this addendum report.

3.1 Background Soil Sample Collection

Two soil samples were collected for analysis from borings EL-1 and PD-2. The samples were collected from native soils in EL-1 at a depth of 0 to 2 feet below ground surface elevation and from 2 to 7.5 feet below ground surface elevation just above the water table. At location PD-2, the soil samples were collected from native soils at a depth of 7.5 to 9.5 feet below ground surface elevation. The four samples were analyzed for Target Compound List (TCL) metals.

All soil samples were logged in the field by a qualified professional in geology. Boring logs and field records include discussions of the lithographic characteristics encountered according to the

Unified Soil Classification System (USCS). The structure, texture, mineral composition, moisture content, color and name is described in the monitor well construction diagram presented as **Figure 2** for monitor well EL-1, and the lithographic log presented as **Figure 7** for boring PD-2. No visual or olfactory evidence indicating the presence of hydrocarbons was noted at either of the two locations.

The purpose of boring PD-2 was to collect background soil samples from a location upgradient of the Eastern Cooling Water Lagoon Impoundment, Western Cooling Water Lagoon Impoundment, Aeration Lagoon Impoundment, and Oxidation Lagoon Impoundment. The boring was performed 25 feet south of monitor well PD-2. The boring was continuously logged to a depth of 11.5 feet below ground surface elevation. Fill was encountered to a depth of 7.5 feet below ground surface elevation. Groundwater was encountered at a depth of 9 feet below ground surface elevation.

Samples PD-2A and PD-2B were collected in native soils from a depth of 7.5 to 9.5 feet below ground surface elevation. The top half of the recovered sample was labeled as PD-A. The bottom half of the recovered sample was labeled as PD-B. The samples were analyzed for TCL metals. **Table 2** summarizes the analytical results of these samples.

The lithology of the soils encountered in boring PD-2 consists of fill (limestone gravel with tan calcareous clay) to a depth of 7.5 feet below ground surface elevation. Tan silty clay (CL) with calcareous nodules was present from 7.5 feet to 9.5 feet below ground surface elevation. The silty clay was saturated below a depth of 9 feet and gray below 9.5 feet. The boring was terminated at a depth of 11.5 feet below ground surface elevation. The boring was grouted to total depth with a Portland cement and bentonite mixture (95%/5% by dry weight) hydrated with 3-4 gallons of water per 47 pound sack of cement once the samples had been collected.

The purpose of boring EL-1 was to collect background soil samples from a location upgradient of the Eastern Oil Lagoon Impoundment and to install a replacement monitor well as described in Section 3.0. The boring is located approximately 100 feet north of the original monitor well labeled EL-1, which was plugged and abandoned by DSM. The boring was continuously logged to a depth of 10 feet below ground surface elevation. Groundwater was encountered at a depth of 7.5 feet below ground surface elevation.

The lithology of the soils encountered in boring EL-1 consists of Silty Clay (CL) from a depth of .3 feet to 4 feet below ground surface elevation and from 6 to 8 feet below ground surface elevation. Clayey Silt (ML) was present from 4 to 6 feet below ground surface elevation. Clayey very fine Sand (SM) was present from 8 to 10 feet below ground surface elevation. The silty clay was saturated below a depth of 7.5 feet below ground surface elevation. Silty Gravel (SM) was present from 14 to 16 feet below ground surface elevation. The boring was completed as replacement monitor well EL-1 as described in Section 3.0.

Four soil samples were collected within boring EL-1 and analyzed for TCL metals. Sample EL-1A was collected in native soils from a depth of zero to 2 feet below ground surface elevation. Samples EL-1B, Dup #1, and Dup #2 were collected from 2 to 7.5 feet below ground surface elevation. These soil samples were collected in a clean stainless steel bowl, mixed, and placed in three separate sample containers. **Table 2** summarizes the analytical results of these samples.

3.2 Groundwater Sample Collection

A groundwater sample was collected from monitor well PD-2. Upon opening the 2-inch diameter well cap, a water level measurement was taken to the nearest 0.01 foot with respect to the established survey point on top of the 2-inch well casing using an E-line. The E-line was decontaminated with a mixture of a mild detergent and potable water, rinsed with potable water, and rinsed with deionized water prior to being used and between each monitor well. The total depth of the well was sounded. The depth to the static water surface was subtracted from the total casing depth to determine the height of standing water in the casing.

A single groundwater purge volume was determined by using the following formula:

$$V = \Pi r^2 H x 7.48 gal/ft^3$$

A dedicated PVC bailer was used to remove three times the calculated volume of water in the well. Bailing was performed through the entire length of the water column in order to remove stagnant water and to provide recharge through the entire length of the well screen. The groundwater sample was collected using the previously referenced bailer. The bailer was carefully lowered 1 to 2 feet into the water column of the well and the sample withdrawn to the surface. Hydrocarbons were not noted in the well during purging.

The sample was analyzed for all Appendix IX constituents, which are as follows: extractable organics (BNA), total metals (unfiltered), dissolved metals (filtered), cyanide, sulfide, pesticides/PCB, chlorinated herbicides, organo-phosphorus pesticides, dioxins, and furans. Groundwater sample PD-2, which was analyzed for dissolved metals, could not be filtered and preserved in the field due to the large quantity of silt present in the sample which would plug the field filtering device. The samples were submitted to the laboratory unfiltered and unpreserved. The samples were filtered and preserved by Huntington Engineering & Environmental, Inc. Laboratory (Huntington) prior to being analyzed.

Table 3 summarizes the results of the groundwater sample labeled as PD-2, as well as the PD-2 duplicate, matrix spike, and matrix spike duplicate collected along with this sample. The data indicates that all volatile and semi-volatile organics, sulfide, cyanide, pesticides/PCB, chlorinated herbicides, and organo-phosphorus pesticides were not detected above the method detection limits for each parameter. Aluminum, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Magnesium, Manganese, Nickel, Potassium, Sodium, Tin, Vanadium, and

Zinc were detected at concentrations which are thought to reflect background levels considering the silty groundwater matrix. This conclusion is substantiated by a comparison with the dissolved metals sample which only detected Barium, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, and Zinc at low concentrations. Total Tetrachlorodibenzofuran and Total Pentachlorinated dibenzofuran were detected at a concentration of .11 and .04 ng/l, respectively. These concentrations are in the part per trillion range. It should be noted that methylene chloride was detected in the trip blank which accompanied the groundwater samples to the laboratory. However, methylene chloride is a common laboratory contaminant.

3.3 Decontamination Procedures

The sampling tools were decontaminated between collection of individual samples and between sampling locations. All downhole equipment was decontaminated prior to the drilling of a boring. The sampling tools and downhole equipment was decontaminated using a high-pressure, hot water steam cleaner, and potable water. Items which were steam cleaned included drill pipe, hollow-stem auger flights, and split spoons. This equipment was decontaminated within a temporary decontamination pit located adjacent to the plant's API separator and constructed for the containment of generated liquids. The bottom and sides of the pit were lined with visqueen to enable the collection of decontamination generated liquids. The liquids generated during decontamination procedures was pumped to the CORCO API separator unit.

At the soil boring site, the sampling equipment was decontaminated between samples using first a washing and scrubbing in a mild laboratory detergent and potable water, followed by a potable water rinse, washed with nitric acid solution, rinsed with HPLC-grade water, rinsed with pesticide-grade acetone, and rinsed thoroughly with HPLC-grade water. The equipment was then allowed to air dry. The on-site decontamination procedures were used on sampling devices such as sample trays, knives, shovel, post hole digger, and trowels.

3.4 Waste Management

The drill cuttings and monitor well development water generated during the investigation were accumulated on-site in an environmentally safe manner. The generated waste was accumulated on-site in 55-gallon steel drums. Each drum was labeled with a permanent marker which described the drum contents and date the waste was generated. CORCO is responsible for the proper management and disposal of the waste generated during this investigation.

4.0 MONITOR WELL PLUG AND ABANDONMENT

Monitor wells EL-1 and EL-2 were plugged and abandoned. Monitor EL-1 was installed adjacent to an abandoned borehole. Due to possible contamination caused by this abandoned borehole, this well was plugged and abandoned and replaced as previously described in Section 3.0 of this addendum. Monitor well EL-2 was installed with a 10-foot screen due to the presence of heaving sands. This well was plugged and abandoned and replaced with the installation of a monitor well with a 20-foot screen as previously discussed in Section 3.0 of this addendum.

The well materials reportedly used to install the original wells consist of two-inch diameter, flush-joint threaded stainless steel with 10-20 feet continuously wound screen (0.01 inch slot) and a one foot sump. The screened interval was extended to two feet above the water table. Filter sand (6/20) was placed in the annulus to approximately one foot above the top of the screen. Approximately one foot of bentonite pellets were added above the sand pack. The annular space above the bentonite seal was grouted to the ground surface using a Portland cement/bentonite mixture.

DSM measured the total depth of the wells. The well riser was over-reamed with a 3 3/8 inch I.D. hollow stem auger. The rig proceeded to the depth of the bottom of the screen. The stainless steel riser and screen were pulled from the borehole within the augers. The augers were then removed. All of the two inch diameter stainless materials used to initially construct these wells were recovered intact from each of the respective boreholes. A one foot long sump, ten (10) long screen, and two ten foot long riser blanks were recovered from EL-1. A one foot sump, twenty foot long screen, and a five foot and two foot long blank risers were recovered from EL-2. The borehole was then grouted with a mixture of 95% Portland cement and 5% bentonite by weight with approximately 3-4 gallons of water per 47 pound sack of cement.

All equipment used to perform plug and abandonment operations was decontaminated with a steam cleaner in accordance with the procedures outlined in Section 3.3 of this addendum. Waste materials generated during plug and abandonment activities were managed as outlined in Section 3.4 of this addendum.

5.0 EASTERN OIL LAGOON IMPOUNDMENT INVESTIGATION

Four soil samples were collected within the Eastern Oil Lagoon Impoundment at locations as depicted in **Figure 8**. The four samples were collected six inches to one foot beneath the sludge blanket present in the basin. The samples were analyzed for total petroleum hydrocarbons. The thickness of the sludge layer was noted and recorded in the field book at these locations. The sludge layer was removed with the use of a shovel. The discrete soil samples were collected with the use of a post hole digger. The soil samples provide DSM with a rough estimate of vertical migration of total petroleum hydrocarbons within the basin. The analytical results and depth of collection of the samples below ground surface elevation are presented in **Table 4.**

In order to determine a rough order of magnitude of the volume of sludge present within the solid waste management unit, a grid was constructed within the Eastern Oil Lagoon Impoundment as depicted in **Figure 9**. Grid point AA' represents a location approximately 30 feet south and 50 feet east of the northwest corner of the unit. This point indicates the presence of nine inches of sludge. Grid point DC' represents a location approximately 180 feet south and 150 feet east of the northwest corner of the unit. This point indicates the presence of one inch of sludge. A shovel was used to dig through the sludge blanket into native soils. The thickness and description of the sludge was noted in the field book. The results of this investigation are presented in **Table 5**. The estimated volume of in-situ sludge within the Eastern Oil Lagoon Impoundment is approximately 1,402 cubic yards. The minimum volume of in-situ affected soil within the Eastern Oil Lagoon Impoundment is approximately 3,428 cubic yards. This information is presented in **Table 6.**

6.0 GROUNDWATER LEVEL MEASUREMENTS

Groundwater level measurements were collected for eight (8) monitor wells to establish the hydraulic gradient for the site. Groundwater levels were recorded for monitor wells EL-1, EL-2, EL-3, EL-4, WL-2, WL-3, WL-4, and PD-2. **Tables 7 and 8** present the water level data obtained on September 27, 1994 and October 5, 1994, respectively. The levels were recorded within a two and one-half hour time period. The levels were measured from the top of well riser casing. The E-line was decontaminated with a mixture of a mild detergent and potable water, rinsed with potable water, and rinsed with deionized water before beginning and in between each well measuring event.

Monitor wells WL-2, WL-3, WL-4, and PD-2 monitor the Eastern Cooling Water Lagoon Impoundment, Western Cooling Water Lagoon Impoundment, Aeration Lagoon Impoundment, and Oxidation Lagoon Impoundment. **Figures 10 and 11** display the hydraulic gradient and potentiometric surface at this location for September 27, 1994 and October 5, 1994, respectively.

Monitor wells EL-1, EL-2, EL-3, and EL-4 monitor the Eastern Oil Lagoon Impoundment. **Figures 12 and 13** display the hydraulic gradient and potentiometric surface at this location for September 27, 1994 and October 5, 1994, respectively.

6.1 Groundwater Flow Direction

The groundwater flow is assumed to be steady-state and laminar. Darcy's Law is assumed to be valid. These assumptions were made to generate the September 27, 1994 and October 5, 1994 potentiometric surfaces at the Facility.

The Western Lagoon Impoundment's area potentiometric surface ranges from a level of 1.01 to 2.34 ft. msl. The standard level was between one and two ft. above msl. The October 5, 1994 potentiometric surface, at the Western Oil Lagoon Impoundment's area, indicates a groundwater flow direction west southwest towards Guayanilla Bay.

The Eastern Oil Lagoon Impoundment potentiometric surface ranges from a level of -0.82 to 5.22 ft. msl. The standard level was between sea level and one ft. above msl. The September 27, 1994 potentiometric surface, at the Eastern Oil Lagoon Impoundment, indicates a groundwater flow direction south towards Tallaboa Bay

6.2 Groundwater Gradient

The hydraulic gradient at the Western Lagoon area has been calculated for the groundwater flow direction west southwest towards Guayanilla Bay. The hydraulic gradient at the Eastern Oil Lagoon Impoundment has been calculated for the groundwater flow direction south towards Tallaboa Bay.

The hydraulic gradient is defined as the change in static head per unit distance in a given direction. The hydraulic gradient defines the direction of flow. The hydraulic gradient is calculated from wells with intermediate water levels (Heath, U.S.G.S. Paper 2220, 1989).

The up-gradient wells, for the southeast groundwater flow direction, are PD-2 and WL-4. The down-gradient well is WL-2. The level measurements are 2.34, 2.04, and 1.01 ft. msl, respectively. The distance between PD-2 and WL-2 is 1,512.85 ft., and the distance between WL-4 and WL-2 is 1,077.38 ft. The change in head between PD-2 and WL-2 is 1.33 ft., and between WL-4 and WL-2 is 1.03 ft. The calculated hydraulic gradient from PD-2 to WL-2 is 8.779 x 10^{-4} ft/ft, and from WL-4 to WL-2 is 9.37 x 10^{-4} ft/ft. The average calculated hydraulic gradient, for the west southwest groundwater flow direction, is 9.07 x 10^{-4} ft/ft.

The up-gradient well for the southern groundwater flow direction is EL-1. The down-gradient wells are EL-2 and EL-4. The level measurements for EL-1, EL-2, and EL-4 are 5.22, 1.02, and -0.82 ft. msl, respectively. The distance between EL-1 and EL-2 is approximately 785 ft., and the distance between EL-1 and EL-2 is approximately 794 ft. The change in head between EL-1 and EL-2 is 4.20 ft. The change in head between EL-1 and EL-4 is 6.04 ft. The calculated hydraulic gradient from EL-1 to EL-2 is 5.35 x 10^{-3} ft/ft, and from EL-1 to EL-4 is 7.60 x 10^{-3} ft/ft. The average calculated hydraulic gradient for the southern groundwater flow direction is 6.47 x 10^{-3} ft/ft.

The average calculated hydraulic gradients of 6.47 x 10^{-3} ft/ft and 9.07 x 10^{-4} ft/ft represents a relative flat gradient in the areas of the Eastern Oil Lagoon Impoundment and the Western Lagoon Area.

6.3 Hydraulic Conductivity

The hydraulic conductivity is a measure of a materials ability to transmit water. The conductivity for the Quaternary Alluvial Deposits aquifer is an estimate based on hydrometer/sieve analysis using geotechnical methodology ASTM 63 D422 (rev. 1990). The particle distribution was evaluated on soil samples collected from borings EL-1, EL-2 and PD-4. The samples were selected, from the samples analyzed at the Eastern Oil Lagoon Impoundment and in the vicinity of the Western Lagoon Impoundment area, from the saturated zone of three soil borings. There was hydrometer/sieve data on five of the six selected soil samples from the aquifer of the Quaternary Alluvial Deposits.

The hydraulic conductivity (K) is estimated from the particle size distribution using the Hazen formula:

$$K = A(d_{10})^2$$

where:

d_{10} is equal to the effective grain size, which is that grain size diameter at which 10 percent by weight of the particles are finer and 90 percent are coarser (Freeze and Cherry, 1979)

A is equal to 1.0 when K is in units of cm/sec and d_{10} is in mm.

The following is a list of the sample point, depth below ground surface and analytical d_{10} results used to estimate the hydraulic conductivity of the Alluvial Deposits at the CORCO Facility:

Sample Point	Depth (ft. bls)	d_{10} (mm)
EL-1	8-10	0.01
EL-2	13-15	0.01
PD-4	16-18	0.001
PD-4	20-22	0.01

The conversion constant of 2,835 ft/day was used to convert hydraulic conductivity units reported in cm/sec to ft/day. The estimated hydraulic conductivity across the CORCO Facility ranges from 2.835 ft./day to 28.35 ft./day. This estimate is acceptable as the resulting conductivity values only vary a magnitude between all results calculated.

6.4 Groundwater Velocity

The groundwater velocity is directly related to hydraulic gradient. The average linear velocity (v) of the groundwater at the CORCO Facility was calculated using Darcy's Law. Darcy's Law is as follows:

$$v = -\frac{Ki}{n_e}$$

where:

K is the hydraulic conductivity (length/time)
i is the hydraulic gradient (length/length)
n_e is the effective porosity

The values derived from the hydraulic estimates calculated for the Alluvial aquifer are the values utilized to estimate the groundwater velocity. These values are:

K = 2.835 ft./day to 28.35 ft./day
i = 9.07×10^{-4} ft/ft. to 6.47×10^{-3} ft/ft
n_e = 1.0

The effective porosity for water is 1.0 using the assumption that all pores in a sediment are inter connected (Fetter, 1989). The estimated groundwater velocity ranges from 2.571×10^{-3} ft/day to 0.1836 ft./day in the Alluvial Deposits aquifer at the CORCO Facility.

7.0 SAMPLE PRESERVATION

Sample containers, volumes, preservation, and holding times were as specified by the methods outlined in SW-846. Samples were placed in labeled sample containers at the time of collection. Pertinent information, such as field sample identification number, date and time of collection, size and material of sample container, sample type, preservative, requested analysis, and sampler were recorded on the sample container and chain-of-custody form. Groundwater sample PD-2, which was analyzed for dissolved metals, could not be filtered and preserved in the field due to the presence of silt in the sample. The sample was filtered and preserved at Huntington Engineering & Environmental, Inc. Laboratory (Huntington).

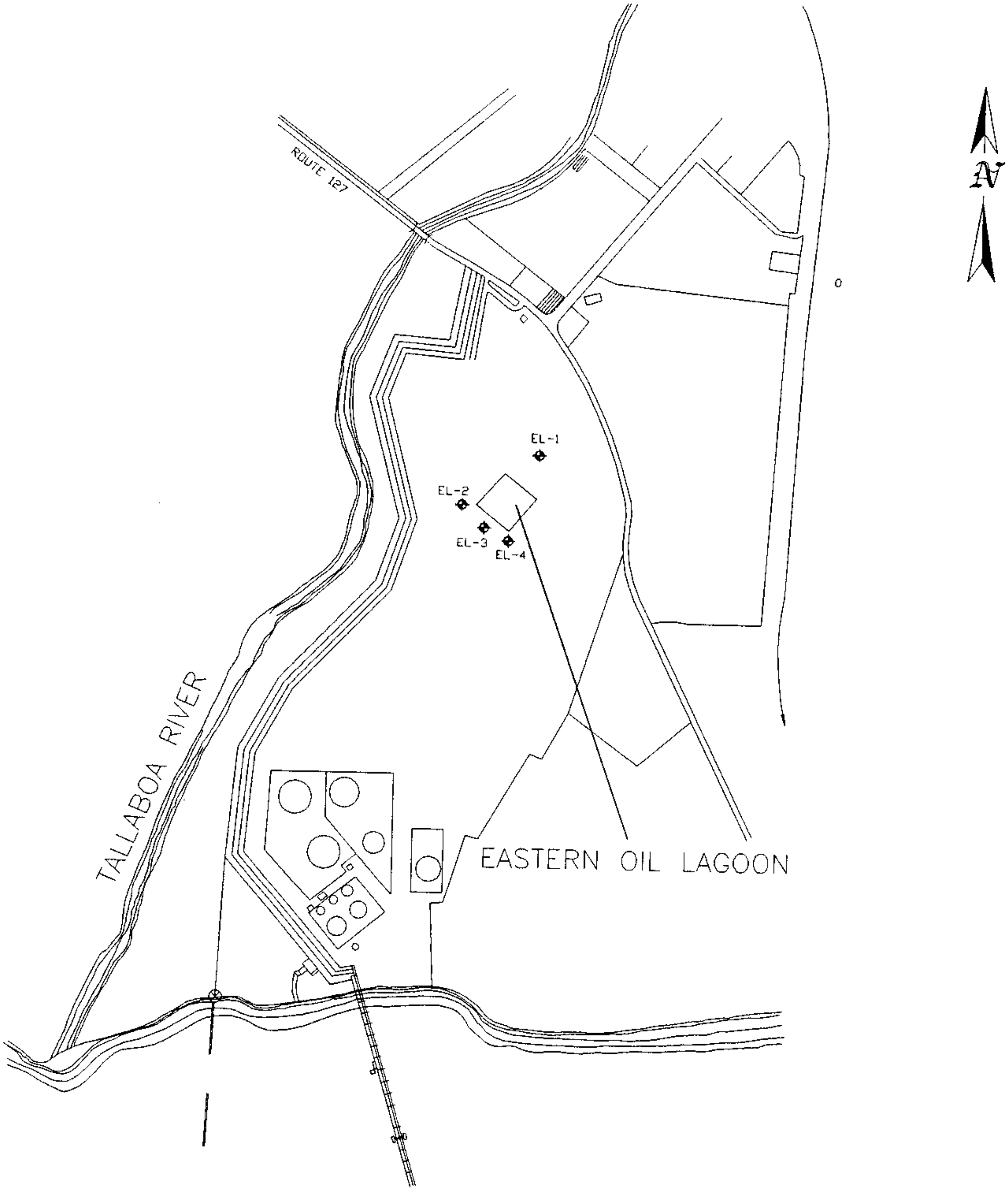
8.0 FIELD AND LABORATORY QUALITY CONTROL SAMPLES

Three duplicate samples were collected during the implementation of the project. One groundwater sample duplicate was collected to ensure that the laboratory procedures are precise. The sample was analyzed for Appendix IX constituents. Two soil sample duplicates were collected. These sample were analyzed for the Target Compound List metals. Matrix spike and matrix spike duplicate samples of groundwater were also collected for the laboratory. One trip blank sample accompanied the samples and was analyzed for Appendix IX volatile organic constituents. The results of these samples are in **Table 2.**

9.0 DATA VALIDATION

The analytical results from Huntington were validated by personnel not directly involved with the analytical testing. The data validation reports are presented as **Appendix B**. A copy of the original laboratory data package is presented as **Appendix C**. All data was validated with regard to usability according to the quality assurance set forth in the U.S. EPA's National Functional Guidelines for Organic and Inorganic Data Review. The reported data is considered acceptable and representative with the applied qualifiers.

FIGURES



DSM Environmental Services, Inc.

EASTERN OIL LAGOON IMPOUNDMENT LOCATION MAP

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		1-16-95	

SCALE N.T.S.	PHASE NO.	FIG. NO. 1	SHEET 1 OF 1

DSM Environmental Services, Inc.

FIGURE 2

Company Name: Commonwealth Oil Refining Co. Well/Boring Designation: EL-1 Page: 1 of 1

Location: Approx. 475' North of Eastern Lagoon Impoundment Date drilled: 9-30-94

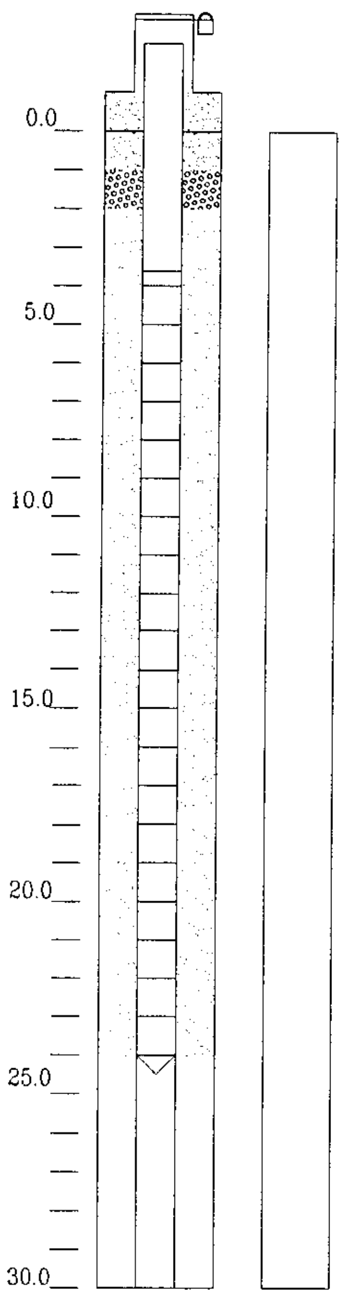
T.O.C. 15.19' G.L. 12.07' Cement: Interval 0-1' Type Portland Cement

Seal:Interval 1'-2' Type: Bentonite Pellets Filter pack: Interval: 2'-11.5' Type: Pea Gravel

Casing: Interval 3'8" - +3' Length 6'8" Dia. 2" Type PVC

Screen: Interval 3'8" - 23'8" Length 20' Slot 0.01" Type PVC Sump: 6"

Driller: William Perez Contractor Victor Rivera & Associates Logged by: Gerardo H. Garcia



Moisture Content	Group Symbol	Toughness	Plasticity	Sample Number	Organic Vapor	Sample Recovery	Group Name/Lithology/Remarks
					0	45	Humus 4" thick
M	CL	Low	Med	0-2			Silty clay (CL) brown, firm, medium plasticity, moist
				2-4	0	60	Stiff below 2'
M	ML	Med	Med	4-6	0	70	Clayey silt (ML)
M W	CL	Low	Med	6-8	0	90	Silty clay (CL) saturated below 7.5'
W	SM	N/A	Non	8-10	0	30	Clayey very fine sand (SM), some silt, trace of gravel
W	SP	N/A	Non	14-16	0	50	Silty gravel(SM), some clay, some sand

T.D. = 24.2'

DSM Project # 1019-02

DSM Environmental Services, Inc.

FIGURE 3

Company Name: Commonwealth Oil Refining Co. Well/Boring Designation: EL-2 Page: 1 of 1

Location: Approximately 150' SW of Eastern Lagoon Impoundment Date drilled: 9-30-94

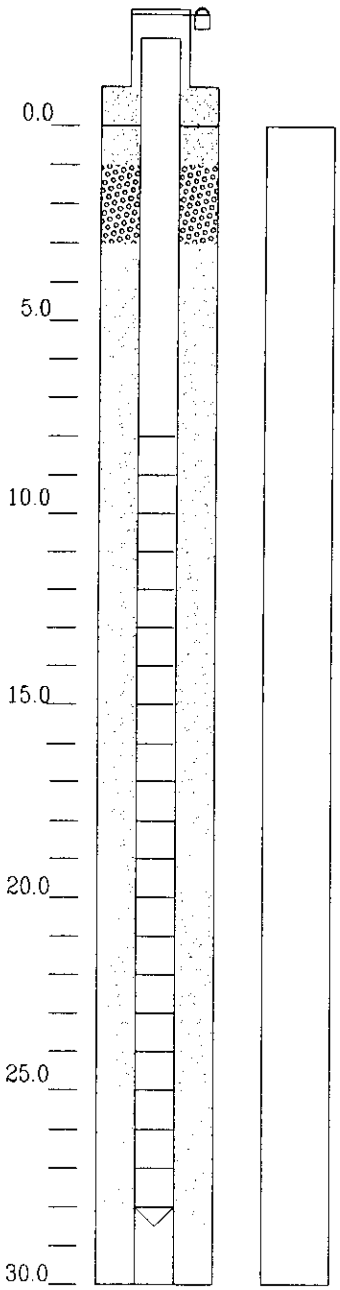
T.O.C. 17.23' G.L. 14.24' Cement: Interval 0-1' Type Portland Cement

Seal:Interval 1'-3' Type: Bentonite Pellets Filter pack: Interval: 3'-24'8" Type: Pea Gravel

Casing: Interval 8' - +3' Length 11' Dia. 2" Type PVC

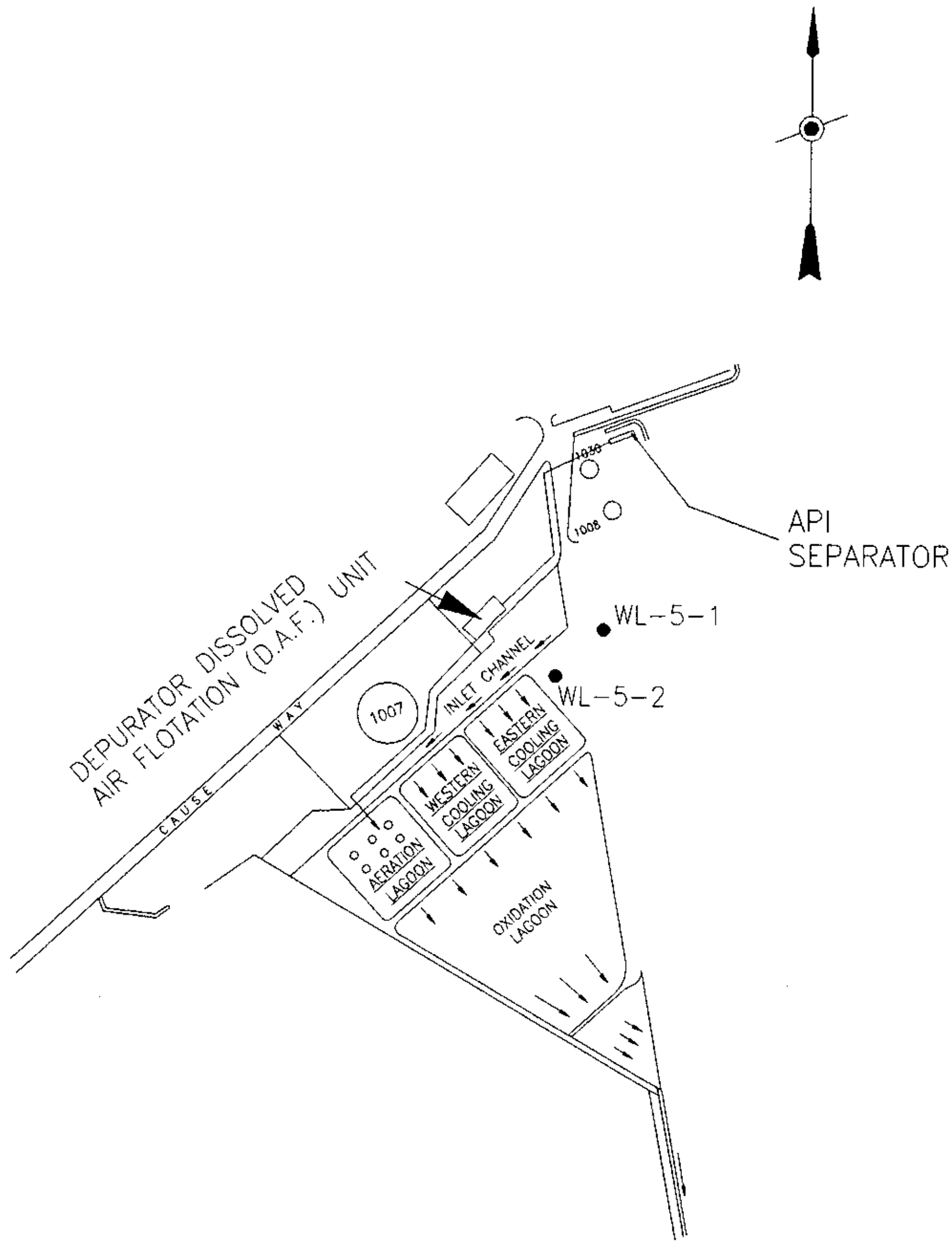
Screen: Interval 8' - 28' Length 20' Slot 0.01" Type PVC Sump: 6"

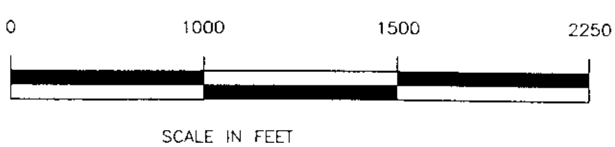
Driller: William Perez Contractor Victor Rivera & Associates Logged by: Gerardo H. Garcia



Moisture Content	Group Symbol	Toughness	Plasticity	Sample Number	Organic Vapor	Sample Recovery	Group Name/Lithology/Remarks
					0		Fill to 12' Tan calcareous clay w/ calcareous nodules and limestone
					0		
					0		
					0		
					0		
					0		
					0		
M	CL CH	Low	M H	13-15	0		Silty clay (CL) to clay (CH) dark gray, firm, medium to highly plastic
M	CL	Low	M	18-19	0		Silty clay (CL) medium plasticity
M	CL	Low	M	19-20	0		Very fine sandy clay (CL) saturated below 20'
W							
	SP						Sand (SP) unconsolidated, olive gray w/ trace of gravel
							T.D. = 28.5'

DSM Project # 1019-02





DSM Environmental Services, Inc.

WESTERN LAGOON AREA

CORCO FACILITY

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		9-27-94	
SCALE NOTED	PHASE NO.	FIG. NO. 4	SHEET 1 OF 1	

FIGURE 5

Lithographic Log

Client	Commonwealth Oil Refining Company, Inc.	**Boring #**	WL-5-1
Project Name	Site Assessment Addendum	**Method/Dia.**	Hollow Stem Auger 6 3/4 " OD
Project Number	1019-02	**Date Started**	9/29/94
Project Manager	Gerardo H. Garcia	**Date Finished**	9/29/94
Drilling Co.	Victor E. Rivera Associates	**Total Depth**	8' bls

Depth in Feet (bls)	Description		Sample #	Type	PID Value	Sample Zone	Odor
0	Fill	Limestone gravel with trace of tan calcareous clay (CL)			o		
1					o		
2					o		
3					o		
4					o		
5					57		
6	Clay (CL):	tan, firm, medium plasticity, moist, calcareous	6-8	SS	60	6-8	Hydrocarbs.
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
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47							
48							
49							
50							

FIGURE 6

Lithographic Log

Client	Commonwealth Oil Refining Company, Inc.	Boring #	WL-5-2
Project Name	Site Assessment Addendum	Method/Dia.	Hollow Stem Auger 6 3/4 " OD
Project Number	1019-02	Date Started	9/29/94
Project Manager	Gerardo H. Garcia	Date Finished	9/29/94
Drilling Co.	Victor E. Rivera Associates	Total Depth	8' bls

Depth in Feet (bls)	Description		Sample #	Type	PID Value	Sample Zone	Odor
0	Fill	Limestone gravel with trace of tan calcareous clay (CL), gray below 1 foot			0		
1					0		
2					0		
3					0		
4	Clay (CL):	firm, medium plasticity, moist, calcareous	4-6	SS	57	4-6	Hydrocarbs.
5							
6		soft, medium plasticity, moist, saturated with hydrocarbons	6-8	SS	60	6-8	Hydrocarbs.
7							
8							
9							
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FIGURE 7

Lithographic Log

Client	Commonwealth Oil Refining Company, Inc.	**Boring #**	PD-2
Project Name	Site Assessment Addendum	**Method/Dia.**	Hollow Stem Auger 6 3/4 " OD
Project Number	1019-02	**Date Started**	9/29/94
Project Manager	Gerardo H. Garcia	**Date Finished**	9/29/94
Drilling Co.	Victor E. Rivera Associates	**Total Depth**	11.5' bls

Depth in Feet (bls)	Description		Sample #	Type	PID Value	Sample Zone	Odor
0	Fill	Limestone gravel with tan calcareous clay (CL)			o		
1					o		
2					o		
3					o		
4					o		
5					o		
6					o		
7	Silty Clay (CL)	tan, firm, medium plasicity, moist, with calcareous nodules	PD-2A	SS	o	7.5-9.5	
8		wet beneath 9 feet	PD-2B		o		
9							
10							
11							
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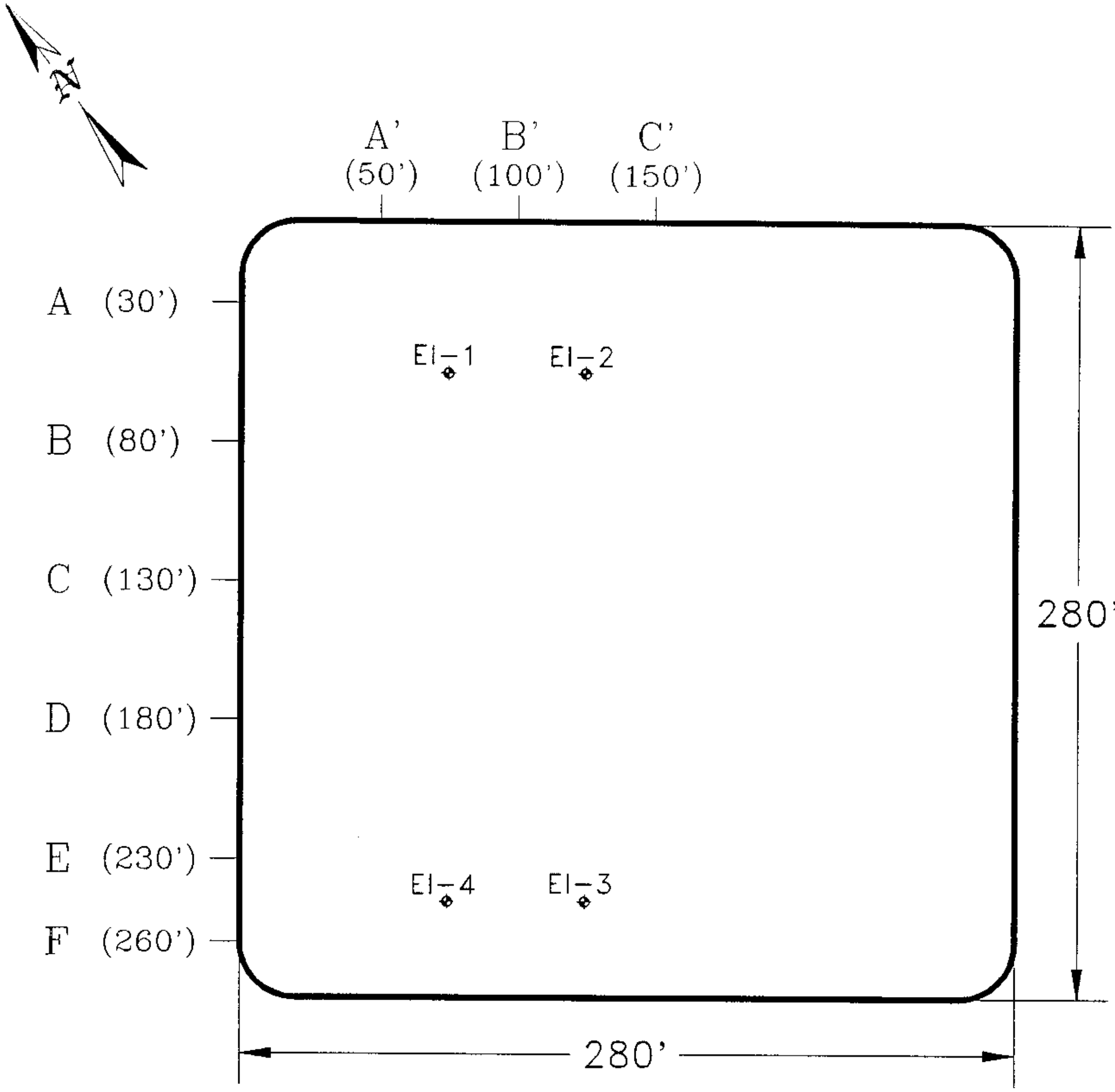


LEGEND

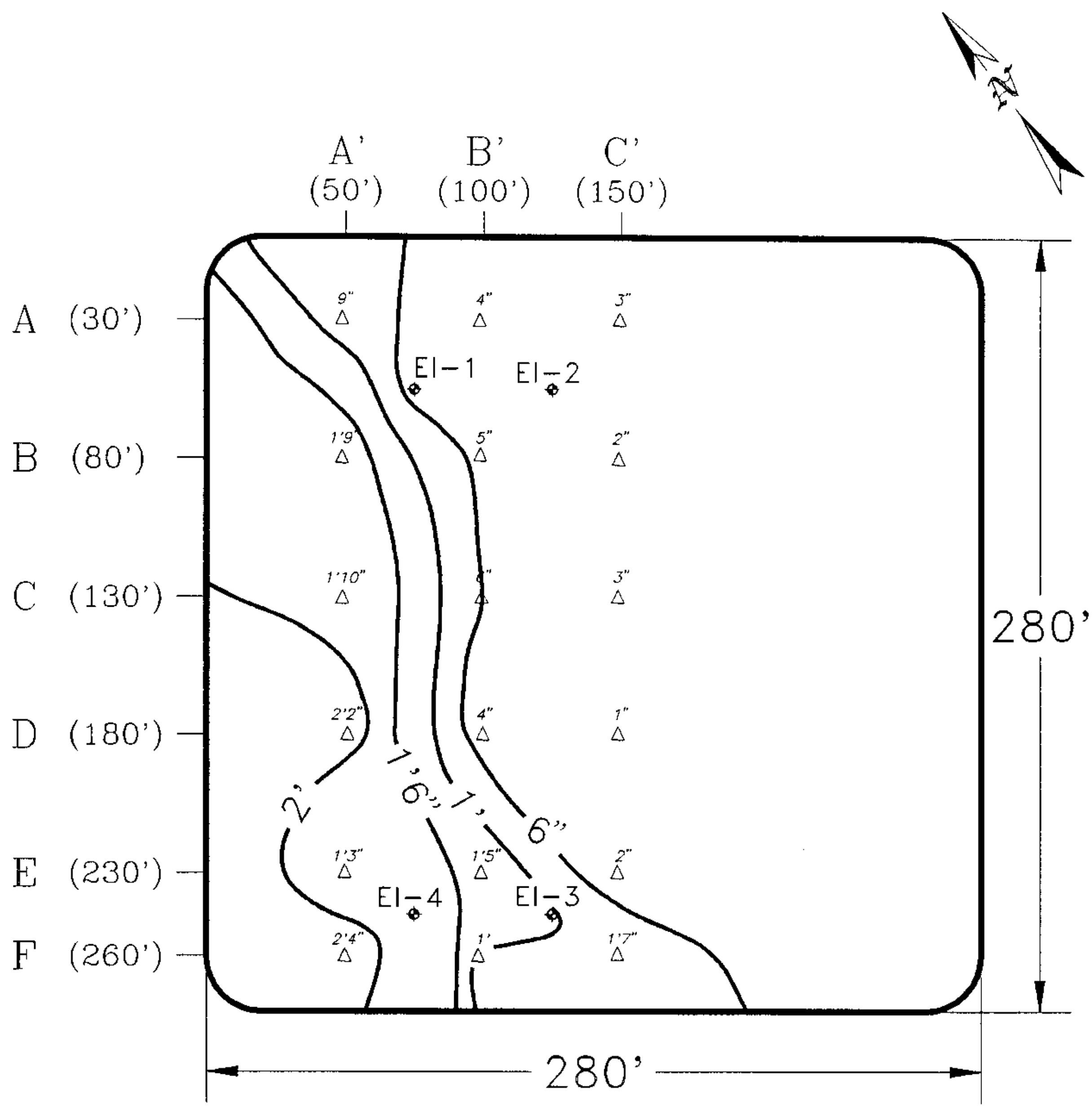
EI-3 SOIL SAMPLE LOCATION

DSM Environmental Services, Inc.

Eastern Oil Lagoon Impoundment Soil Sample Location Map

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	MB	GHG	11/9/94	

SCALE NONE	PHASE NO.	FIG. NO. 8	SHEET 1 OF 1



LEGEND

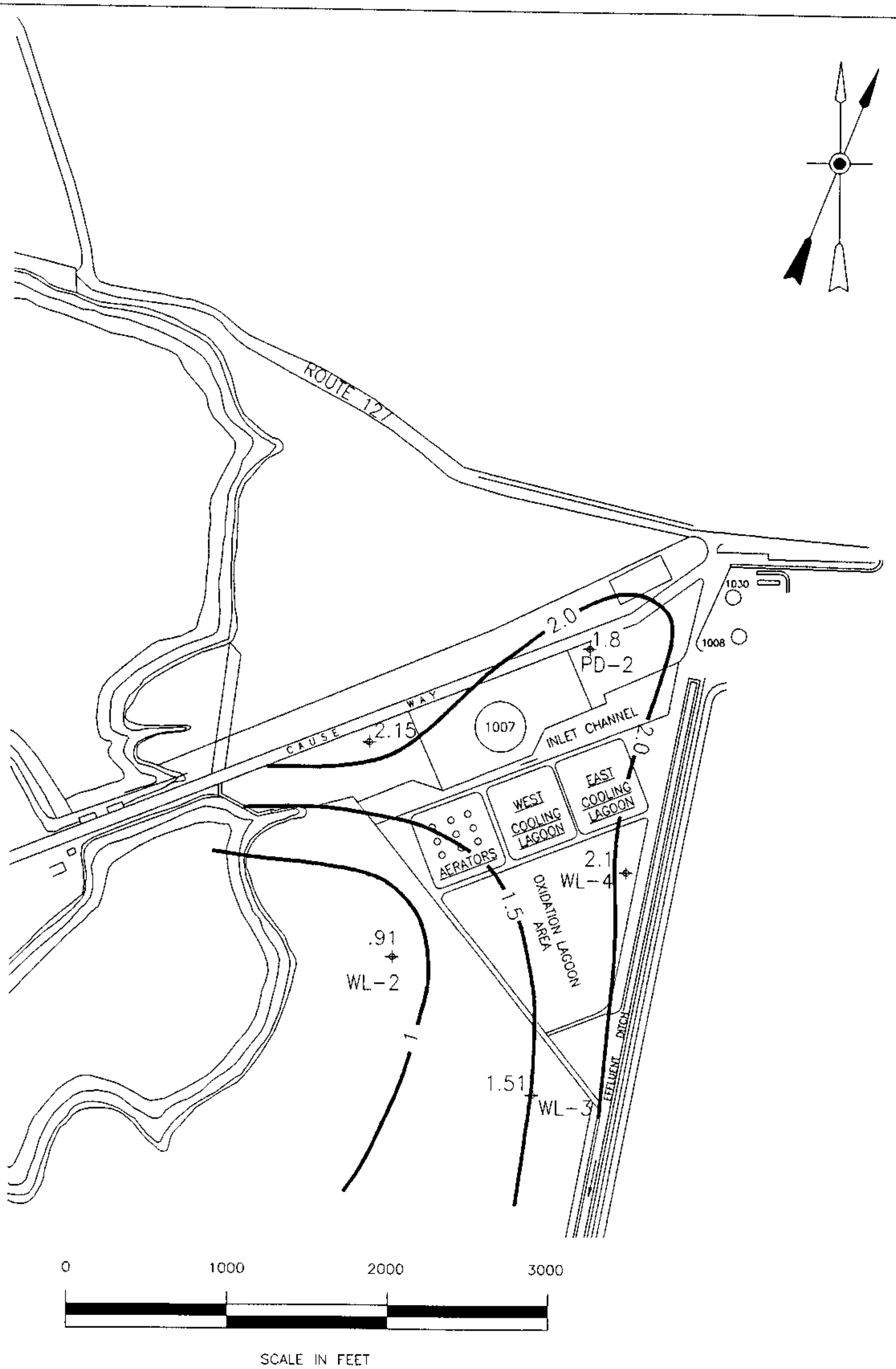
- △ SLUDGE GRID THICKNESS MEASUREMENT POINT
- EI-3 SOIL SAMPLE LOCATION
- 2' ISOPACH

DSM Environmental Services, Inc.

Eastern Oil Lagoon Impoundment Sludge Thickness Map

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	MB	GHG	11/9/94	

SCALE NONE	PHASE NO.	FIG. NO. 9	SHEET 1 OF 1



LEGEND

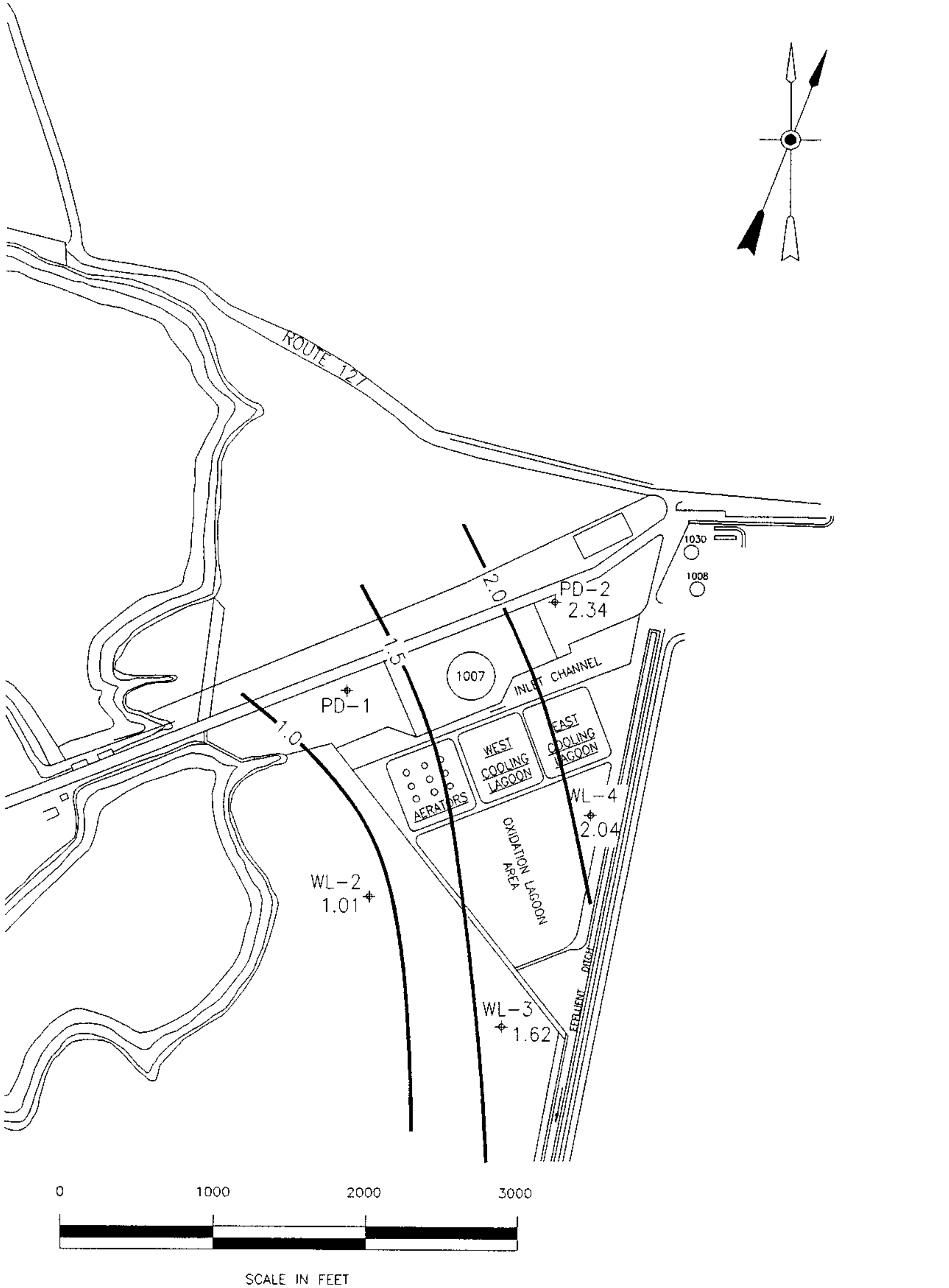
WL-1 RCRA MONITORING WELL

CONTOURS

DSM Environmental Services, Inc.

WESTERN LAGOON AREA
POTENTIOMETRIC SURFACE MAP
CORCO FACILITY 9/27/94

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		9-27-94	
SCALE NOTED	PHASE NO.	FIG. NO. 10	SHEET 1 OF 1	



LEGEND

WL-1 RCRA MONITORING WELL

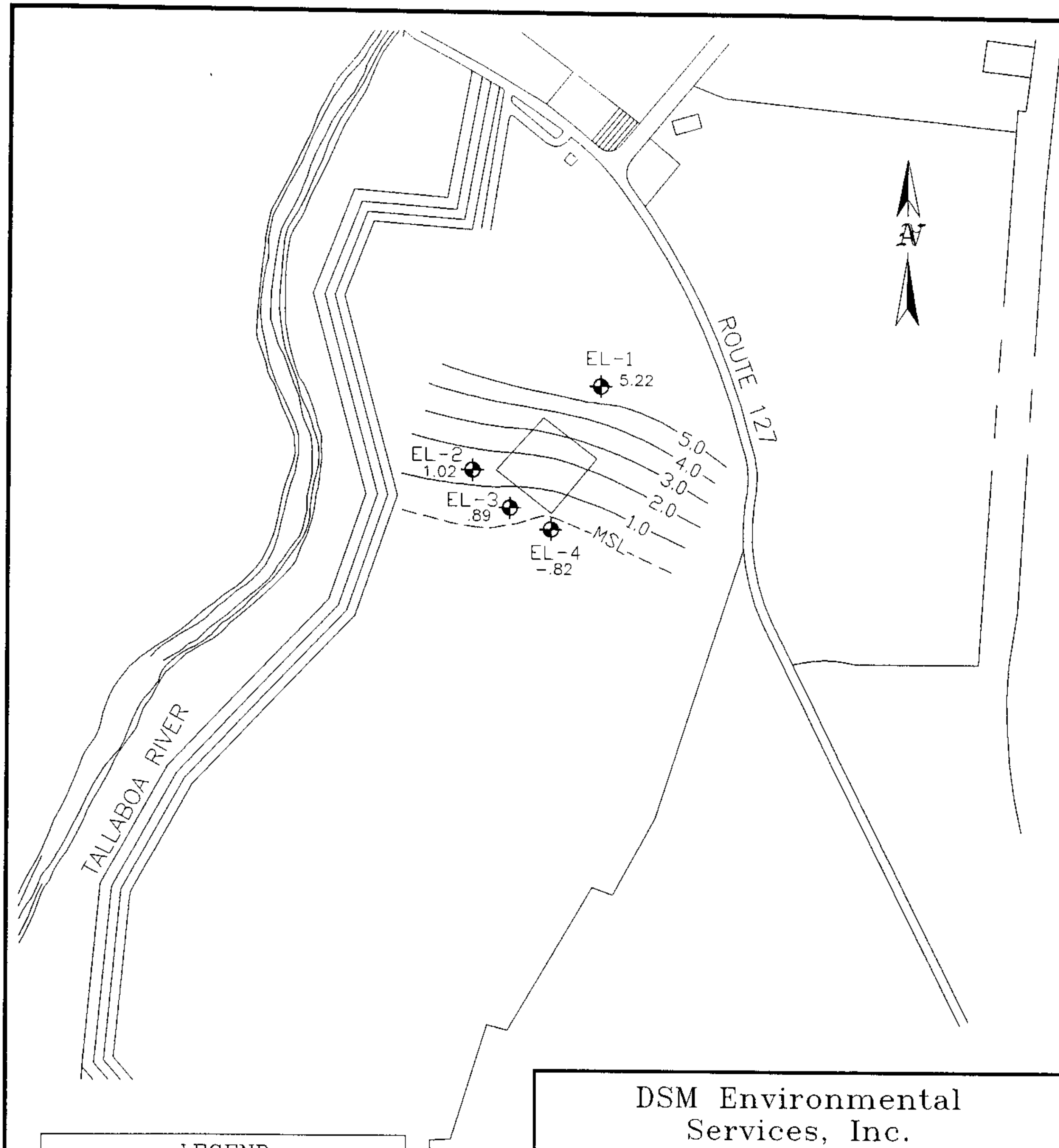
CONTOURS

DSM Environmental Services, Inc.

WESTERN LAGOON AREA
POTENTIOMETRIC SURFACE MAP
CORCO FACILITY 10/05/94

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		9-27-94	

SCALE NOTED	PHASE NO.	FIG. NO. 11	SHEET 1 OF 1



LEGEND

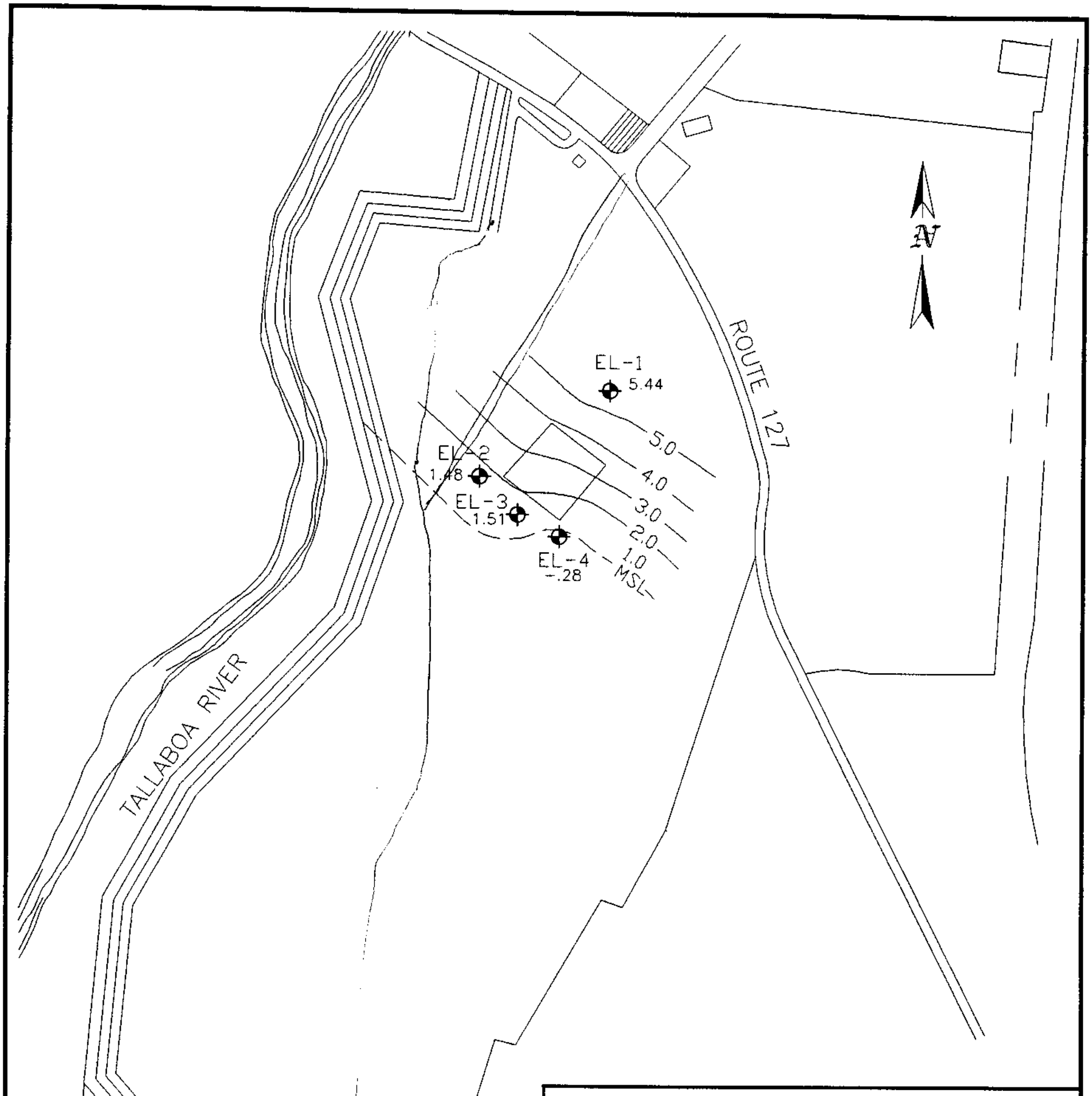
MSL (MEAN SEA LEVEL)
EI-3 SAMPLE LOCATION
2' ISOPACH
GROUNDWATER FLOW DIRECTION

DSM Environmental Services, Inc.

EASTERN OIL LAGOON IMPOUNDMENT POTENTIOMETRIC SURFACE MAP 9/27/94

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		9-27-94	

SCALE N.T.S.	PHASE NO.	FIG. NO. 12	SHEET 1 OF 1



LEGEND

MSL (MEAN SEA LEVEL)
EL-3 SAMPLE LOCATION
2' ISOPACH
GROUNDWATER FLOW DIRECTION

DSM Environmental Services, Inc.

EASTERN OIL LAGOON IMPOUNDMENT POTENTIOMETRIC SURFACE MAP 10/5/94

PROJECT NO.	DRAWN BY	CHK'D BY	DATE	REV
1019-02	DWM		10-5-94	

SCALE N.T.S.	PHASE NO.	FIG. NO. 13	SHEET 1 OF 1

TABLES

TABLE 1

MONITOR WELL DEVELOPMENT INFORMATION

PROJECT: CORCO SITE ADDENDUM PROJECT LOCATION: PEÑUELAS, PUERTO RICO

CLIENT: DSM ENVIRONMENTAL SERVICES, INC. DATE: OCTOBER 03, 1994

MONITOR WELL NO.: EL-1

WELL DEPTH (ft.): 24.2' {1}

DEPTH TO WATER (ft.): 6.6' {2}

HEIGHT OF WATER COLUMN (ft.): 17.6' {3} = [{1}-{2}]

VOLUME OF WATER (gallons): {3} X 0.165 = 2.9 gallons

FIELD TEST	TEMPERATURE	pH	CONDUCTIVITY
FIRST VOLUME	30.7°C	7.71	0.73 mS/cm
SECOND VOLUME	31.0°C	7.76	0.81 mS/cm
THIRD VOLUME	30.7°C	7.70	0.85 mS/cm
FOURTH VOLUME	30.7°C	7.57	0.82 mS/cm
FIFTH VOLUME	30.9°C	7.55	0.86 mS/cm

REMARKS: WATER OF HIGH TURBIDITY. WELL DEVELOPMENT BEGAN AT 11:20 AM AND WAS COMPLETED AT 13:20. THE WELL RECHARGE RATE ALLOWED FOR CONTINUOUS BAILING TO BE PERFORMED.

DEVELOPED BY: PEDRO J. PEREZ AND RAFAEL RUIZ

SUPERVISED BY: PEDRO J. PEREZ

CHECKED AND APPROVED BY: JOSE R. RIVERA NAZARIO, P.E.

TABLE 1 (CONTINUED)

MONITOR WELL DEVELOPMENT INFORMATION

PROJECT: CORCO SITE ADDENDUM PROJECT LOCATION: PEÑUELAS, PUERTO RICO

CLIENT: DSM ENVIRONMENTAL SERVICES, INC. DATE: OCTOBER 03, 1994

MONITOR WELL NO.: EL-2

WELL DEPTH (ft.): 28.5' {1}

DEPTH TO WATER (ft.): 12.7' {2}

HEIGHT OF WATER COLUMN (ft.): 15.8' {3} = [{1}-{2}]

VOLUME OF WATER (gallons): {3} X 0.165 = 2.6 gallons

FIELD TEST	TEMPERATURE	pH	CONDUCTIVITY
FIRST VOLUME	30.6°C	7.23	2.23 mS/cm
SECOND VOLUME	30.3°C	7.20	2.27 mS/cm
THIRD VOLUME	30.2°C	7.27	2.30 mS/cm
FOURTH VOLUME	29.9°C	7.33	2.22 mS/cm
FIFTH VOLUME	30.2°C	7.32	2.23 mS/cm

REMARKS: WATER OF HIGH TURBIDITY. WELL DEVELOPMENT BEGAN AT 13:40 AND WAS COMPLETED AT 14:15. THE WELL RECHARGE RATE ALLOWED FOR CONTINUOUS BAILING TO BE PERFORMED.

DEVELOPED BY: PEDRO J. PEREZ AND RAFAEL RUIZ

SUPERVISED BY: PEDRO J. PEREZ

CHECKED AND APPROVED BY: JOSE R. RIVERA NAZARIO, P.E.

TABLE 2
BACKGROUND SOIL SAMPLE ANALYTICAL RESULTS
TARGET COMPOUND LIST (TCL)
TOTAL METALS

FIELD SAMPLE I.D.	PD-2A	PD-2B	EL-1A	EL-1B	Dup #1	Dup #2
LABORATORY I.D **TOTAL METALS (MG/KG)**	**01A**	**02A**	**03A**	**04A**	**05A**	**06A**
Aluminum	6,280	8,280	36,500	33,100	31,700	33,000
Antimony	<14.6	<15.9	<15.2	<15.0	<15.0	<15.1
Arsenic	5.91	2.73	<2.53	<2.50	<2.50	<2.51
Barium	33.5	69.1	163	160	130	157
Beryllium	<1.00	<1.00	1.25	1.2	1.17	1.25
Cadmium	<1.00	4.24	<1.0	<1.0	<1.00	<1.00
Calcium	233,000	268,000	16,400	48,800	56,000	50,200
Chromium	33	27.3	77.6	70.9	68.4	72.4
Cobalt	<2.4	23.7	32.2	26.7	27	28.1
Copper	8.43	11.3	76.1	65	63.3	64.7
Iron	9,210	13,600	50,900	48,100	43,800	46,400
Lead	<0.40	13.2	3.29	2.64	2.33	2.36
Magnesium	3,690	5,240	13,900	16,200	14,900	16,300
Manganese	167	226	1,745	181.3	180.2	304.6
Mercury	<0.122	<0.132	<0.127	<0.125	<0.125	<0.125
Nickel	29.2	35,300	38.4	33.7	31.8	33.9
Potassium	<97.6	1,620	1,800	<100	<99.6	<100
Selenium	<1.22	<1.32	<1.27	<1.25	<1.25	<1.26
Silver	<1.00	6.54	<2.00	<2.00	<1.00	<2.00
Sodium	2,020	2,450	478	1,020	999	1,010
Thallium	<2.44	<2.64	<2.53	<2.5	<2.5	<2.51
Tin	<24.4	<26.4	<25.3	<25.04	<25	<25.1
Vanadium	53	53.3	178	177	168	183
Zinc	52.4	26	86.4	84.8	71.1	74.3

TABLE 3
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
TARGET COMPOUND LIST (TCL)
TOTAL METALS

FIELD SAMPLE I.D.	PD-2 TOTAL	PD-2 DUPLICATE TOTAL	PD-2 MATRIX SPIKE TOTAL	PD-2 MATRIX SPIKE DUPLICATE TOTAL
LABORATORY I.D. **PARAMETER (UG/L)**	**13A**	**13B**	**13C**	**13D**
Aluminum	740,000	733,000	64,200	48,100
Antimony	<60	<60	<60	<60
Arsenic	<10.0	<10.0	<10.0	<10.0
Barium	2,240	2,510	190	4,470
Beryllium	26.9	23.6	14.1	32.3
Cadmium	178	174	31.2	68.3
Calcium	6,140,000	6,010,000	2,580,000	2,550,000
Chromium	2,140	2,000	170	350
Cobalt	982	975	288	622
Copper	2,620	2,720	256	558
Iron	1,180,000	1,200,000	147,000	143,000
Lead	<100	164	<100	<100
Magnesium	835,000	862,000	177,000	409,000
Manganese	21,170	27,060	9,562	9,485
Mercury	<0.2	<0.2	5	95
Nickel	1,200	1,190	288	630
Potassium	133,000	137,000	23,500	59,300
Selenium	<5	<5	<5	<5
Silver	<6.0	<6.0	<6.0	<6.0
Sodium	734,000	768,000	215,000	544,000
Thallium	<10	<10	<10	<10
Tin	210	<100	<100	<100
Vanadium	2,980	2,360	671	1,440
Zinc	3,250	3,290	641	1,400

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
TARGET COMPOUND LIST (TCL)
DISSOLVED METALS

FIELD SAMPLE I.D.	PD-2 DISSOLVED	PD-2 DUPLICATE DISSOLVED	PD-2 MATRIX SPIKE DISSOLVED	PD-2 MATRIX SPIKE DUPLICATE DISSOLVED
LABORATORY I.D.	**18A**	**18B**	**18C**	**18D**
PARAMETER (UG/L)				
Aluminum	<70	<70	1,990	2,010
Antimony	<60	<60	84	87
Arsenic	<10	<10	35	35
Barium	1,140	1,120	3,050	3,120
Beryllium	<5.0	<5	50.5	51.1
Cadmium	<5.0	<5.0	47.6	52
Calcium	337,000	342,000	342,000	345,000
Chromium	<10	<10	202	199
Cobalt	<10	<10	497	498
Copper	<6.0	<6.0	249	248
Iron	73.2	93.6	1,260	1,040
Lead	<2.0	<2.0	18.9	17.99
Magnesium	120,000	122,000	120,000	121,000
Manganese	416	416	908	913
Mercury	<0.2	<0.2	0.3	9.6
Nickel	<20	<20	510	505
Potassium	38,700	37,600	38,400	38,800
Selenium	<5	<5	<5	<5
Silver	<6.0	<6.0	54	49.4
Sodium	868,000	869,000	865,000	876,000
Thallium	<10	<10	35	38
Tin	<100	<100	1,540	1,540
Vanadium	<10	<10	520	525
Zinc	96.4	94.9	566	565

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
APPENDIX IX VOLATILES

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE	TRIP BLANK
LABORATORY I.D. PARAMETER (UG/L)	11A	11B	11C	11D	19A
ACETONE	50.0U	50.0U	50.0U	50.0U	50.0U
ACETONITRILE	100.0U	100.0U	100.0U	100.0U	100.0U
ACROLEIN	100.0U	50.0U	50.0U	50.0U	50.0U
ACRYLONITRILE	10.0U	10.0U	10.0U	10.0U	10.0U
ALLYL CHLORIDE	10.0U	5.0U	5.0U	5.0U	5.0U
BENZENE	5.0U	5.0U	54.5	56	5.0U
BROMODICHLOROMETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
BROMOFORM	5.0U	5.0U	5.0U	5.0U	5.0U
CARBON DISULFIDE	5.0U	5.0U	5.0U	5.0U	5.0U
CARBON TETRACHLORIDE	5.0U	5.0U	5.0U	5.0U	5.0U
CHLOROBENZENE	5.0U	5.0U	52.8	54.6	5.0U
CHLOROETHANE	10.0U	10.0U	10.0U	10.0U	10.0U
CHLOROFORM	5.0U	5.0U	5.0U	5.0U	5.0U
CHLOROPRENE	5.0U	5.0U	5.0U	5.0U	5.0U
DIBROMOCHLOROMETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,2-DIBROMO-3-CHLOROPROPANE	5.0U	5.0U	5.0U	5.0U	5.0U
TRANS-1,4-DICHLORO-2-BUTENE	5.0U	5.0U	5.0U	5.0U	5.0U
DICHLORODIFLUOROMETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,1-DICHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,2-DICHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,1-DICHLOROETHENE	5.0U	5.0U	46.2	47	5.0U
TRANS-1,2-DICHLOROETHENE	5.0U	5.0U	5.0U	5.0U	5.0U
1,2-DICHLOROPROPANE	5.0U	5.0U	5.0U	5.0U	5.0U
CIS-1,3-DICHLOROPROPENE	5.0U	5.0U	5.0U	5.0U	5.0U
TRANS-1,3-DICHLOROPROPENE	5.0U	5.0U	5.0U	5.0U	5.0U
1,4-DIOXANE	200U	200U	200U	200U	200U
ETHYLBENZENE	5.0U	5.0U	5.0U	5.0U	5.0U
ETHYL METHACRYLATE	5.0U	5.0U	5.0U	5.0U	5.0U
2-HEXANONE	10.0U	10.0U	10.0U	10.0U	10.0U
ISOBUTYL ALCOHOL	100U	100U	100U	100U	100U
METHACRYLONITRILE	20.0U	20.0U	20.0U	20.0U	20.0U
BROMOMETHANE	10.0U	10.0U	10.0U	10.0U	10.0U
CHLOROMETHANE	10.0U	10.0U	10.0U	10.0U	10.0U
DIBROMOMETHANE	5.0U	5.0U	5.0U	5.0U	5.0U

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
APPENDIX IX VOLATILES (CONTINUED)

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE	TRIP BLANK
LABORATORY I.D. PARAMETER (UG/L)	11A	11B	11C	11D	19A
METHYLENE CHLORIDE	5.0U	5.0U	5.0U	5.0U	23.2
METHYL ETHYL KETONE	50.0U	50.0U	50.0U	50.0U	50.0U
IODOMETHANE	10.0U	5.0U	5.0U	5.0U	5.0U
METHYL METHACRYLATE	5.0U	5.0U	5.0U	5.0U	5.0U
4-METHYL-2-PENTANONE	10.0U	10.0U	10.0U	10.0U	10.0U
PROPIONITRILE	20.0U	20.0U	20.0U	20.0U	20.0U
STYRENE	5.0U	5.0U	5.0U	5.0U	5.0U
1,1,1,2-TETRACHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,1,2,2-TETRACHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
TETRACHLOROETHENE	5.0U	5.0U	5.0U	5.0U	5.0U
TOLUENE	5.0U	5.0U	61.1	61.3	5.0U
1,1,1-TRICHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,1,2-TRICHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
TRICHLOROETHENE	5.0U	5.0U	49	49.1	5.0U
TRICHLOROFLUOROMETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
1,2,3-TRICHLOROPROPANE	5.0U	5.0U	5.0U	5.0U	5.0U
VINYL ACETATE	10.0U	10.0U	10.0U	10.0U	10.0U
VINYL CHLORIDE	10.0U	10.0U	10.0U	10.0U	10.0U
ETHYLENE DIBROMIDE	5.0U	5.0U	5.0U	5.0U	5.0U
PENTACHLOROETHANE	5.0U	5.0U	5.0U	5.0U	5.0U
TOTAL XYLENE	5.0U	5.0U	5.0U	5.0U	5.0U

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
APPENDIX IX SEMI-VOLATILES

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (UG/L)	12A	12B	12C	12D
4-CHLORO-3-METHYLPHENOL	10.0U	10.0U	135	130
2-CHLOROPHENOL	10.0U	10.0U	123	114
4-METHYLPHENOL	10.0U	10.0U	10.0U	10.0U
2-METHYLPHENOL	10.0U	10.0U	10.0U	10.0U
2,4-DICHLOROPHENOL	10.0U	10.0U	10.0U	10.0U
2,6-DICHLOROPHENOL	10.0U	10.0U	10.0U	10.0U
2,4-DIMETHYLPHENOL	10.0U	10.0U	10.0U	10.0U
4,6-DINITRO-2-METHYLPHENOL	20.0U	20.0U	20.0U	20.0U
2,4-DINITROPHENOL	50.0U	50.0U	50.0U	50.0U
DINOSEB	10.0U	10.0U	10.0U	10.0U
HEXACHLOROPHENE	20.0U	20.0U	20.0U	20.0U
2-NITROPHENOL	10.0U	10.0U	10.0U	10.0U
4-NITROPHENOL	50.0U	50.0U	63.8	52.4
PENTACHLOROPHENOL	25.0U	25.0U	77.4	88.6
PHENOL	10.0U	10.0U	60.6	57.2
2,3,4,6-TETRACHLOROPHENOL	10.0U	10.0U	10.0U	10.0U
2,4,5-TRICHLOROPHENOL	10.0U	10.0U	10.0U	10.0U
2,4,6-TRICHLOROPHENOL	10.0U	10.0U	10.0U	10.0U
ACENAPHTHENE	10.0U	10.0U	45.2	47.4
ACENAPHTHYLENE	10.0U	10.0U	10.0U	10.0U
ACETOPHENONE	10.0U	10.0U	10.0U	10.0U
2-ACETYLAMINOFLUORENE	10.0U	10.0U	10.0U	10.0U
4-AMINOBIPHENYL	10.0U	10.0U	10.0U	10.0U
ANILINE	10.0U	10.0U	10.0U	10.0U
ANTHRACENE	10.0U	10.0U	10.0U	10.0U
ARAMITE (1)	10.0U	10.0U	10.0U	10.0U
ARAMITE (2)	10.0U	10.0U	10.0U	10.0U
BENZO(A)ANTHRACENE	10.0U	10.0U	10.0U	10.0U
BENZO(B)FLUORANTHENE	10.0U	10.0U	10.0U	10.0U
BENZO(K)FLUORANTHENE	10.0U	10.0U	10.0U	10.0U
BENZO(GHI)PERYLENE	10.0U	10.0U	10.0U	10.0U
BENZO(A)PYRENE	10.0U	10.0U	10.0U	10.0U
BENZYL ALCOHOL	10.0U	10.0U	10.0U	10.0U
BIS(2-CHLOROETHOXY)METHANE	10.0U	10.0U	10.0U	10.0U
BIS(2-CHLOROETHYL)ETHER	10.0U	10.0U	10.0U	10.0U

TABLE 3 (CONTINUED)

BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS

APPENDIX IX SEMI-VOLATILES (CONTINUED)

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (UG/L)	12A	12B	12C	12D
BIS(2-CHLOROISOPROPYL)ETHER	10.0U	10.0U	10.0U	10.0U
BIS(2-ETHYLHEXYL)PHTHALATE	10.0U	10.0U	10.0U	10.0U
4-BROMOPHENYL PHENYL ETHER	10.0U	10.0U	10.0U	10.0U
BUTYLBENZYLPHTHALATE	10.0U	10.0U	10.0U	10.0U
4-CHLOROANILINE	10.0U	10.0U	10.0U	10.0U
CHLOROBENZILATE	10.0U	10.0U	10.0U	10.0U
2-CHLORONAPHTHALENE	10.0U	10.0U	10.0U	10.0U
4-CHLOROPHENYL PHENYL ETHER	10.0U	10.0U	10.0U	10.0U
CHRYSENE	10.0U	10.0U	10.0U	10.0U
DIALLIATE (CIS OR TRANS)	10.0U	10.0U	10.0U	10.0U
DIALLIATE (TRANS OR CIS)	10.0U	10.0U	10.0U	10.0U
DIBENZO(A,H)ANTHRACENE	10.0U	10.0U	10.0U	10.0U
DIBENZOFURANS	10.0U	10.0U	10.0U	10.0U
DI-N-BUTYLPHTHALATE	10.0U	10.0U	10.0U	10.0U
1,3-DICHLOROBENZENE	10.0U	10.0U	10.0U	10.0U
1,2-DICHLOROBENZENE	10.0U	10.0U	10.0U	10.0U
1,4-DICHLOROBENZENE	10.0U	10.0U	39.2	52
3,3-DICHLOROBENZIDINE	20.0U	20.0U	20.0U	20.0U
DIMETHYLPHTHALATE	10.0U	10.0U	10.0U	10.0U
DIMETHOATE	10.0U	10.0U	10.0U	10.0U
P-DIMETHYLAMINOAZOBENZENE	10.0U	10.0U	10.0U	10.0U
7,12-DIMETHYLBENZ(A)ANTHRACENE	10.0U	10.0U	10.0U	10.0U
3,3-DIMETHYLBENZIDINE	10.0U	10.0U	10.0U	10.0U
A,A-DIMETHYLPHENETHYLAMINE	10.0U	10.0U	10.0U	10.0U
DIETHYL PHTHALATE	10.0U	10.0U	10.0U	10.0U
M-DINITROBENZENE	10.0U	10.0U	10.0U	10.0U
2,4-DINITROTOLUENE	10.0U	10.0U	44.6	54.6
2,6-DINITROTOLUENE	10.0U	10.0U	10.0U	10.0U
DI-N-OCTYL PHTHALATE	10.0U	10.0U	10.0U	10.0U
DISULFOTON	10.0U	10.0U	10.0U	10.0U
ETHYLMETHANESULFONATE	10.0U	10.0U	10.0U	10.0U
FAMPHUR	20.0U	20.0U	20.0U	20.0U
FLUORANTHENE	10.0U	10.0U	10.0U	10.0U
FLUORENE	10.0U	10.0U	10.0U	10.0U

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
APPENDIX IX SEMI-VOLATILES (CONTINUED)

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (UG/L)	12A	12B	12C	12D
HEXACHLOROBENZENE	10.0U	10.0U	10.0U	10.0U
HEXACHLOROBUTADIENE	10.0U	10.0U	135	10.0U
HEXACHLOROCYCLOPENTADIENE	10.0U	10.0U	10.0U	10.0U
HEXACHLOROETHANE	10.0U	10.0U	10.0U	10.0U
HEXACHLOROPHENE	20.0U	20.0U	20.0U	20.0U
INDENO(1,2,3-CD)PYRENE	10.0U	10.0U	10.0U	10.0U
ISODRIN	10.0U	10.0U	10.0U	10.0U
ISOPHORONE	10.0U	10.0U	10.0U	10.0U
ISOSAFROLE	10.0U	10.0U	10.0U	10.0U
KEPONE	50.0U	50.0U	50.0U	50.0U
METHAPYRILENE	100.0U	100.0U	100.0U	100.0U
3-METHYLCHOLANTHRENE	10.0U	10.0U	10.0U	10.0U
METHYLMETHANESULFONATE	10.0U	10.0U	10.0U	10.0U
2-METHYLNAPHTHALENE	10.0U	10.0U	10.0U	10.0U
METHYL PARATHION	10.0U	10.0U	10.0U	10.0U
NAPHTHALENE	10.0U	10.0U	10.0U	10.0U
1,4-NAPHTHOQUINONE	10.0U	10.0U	10.0U	10.0U
1-NAPHTHYLAMINE	10.0U	10.0U	10.0U	10.0U
2-NAPHTHYLAMINE	10.0U	10.0U	10.0U	10.0U
3-NITROANILINE	50.0U	50.0U	50.0U	50.0U
2-NITROANILINE	50.0U	50.0U	50.0U	50.0U
4-NITROANILINE	50.0U	50.0U	50.0U	50.0U
NITROBENZENE	10.0U	10.0U	10.0U	10.0U
4-NITROQUINOLINE-1-OXIDE	100.0U	100.0U	100.0U	100.0U
N-NITROSO-DI-N-BUTYLAMINE	10.0U	10.0U	10.0U	10.0U
N-NITROSODIETHYLAMINE	10.0U	10.0U	10.0U	10.0U
N-NITROSODIMETHYLAMINE	10.0U	10.0U	10.0U	10.0U
N-NITROSODIPHENYLAMINE	10.0U	10.0U	10.0U	10.0U
N-NITROSO-DI-N-PROPYLAMINE	10.0U	10.0U	59	72
N-NITROSOMETHYLETHYLAMINE	10.0U	10.0U	10.0U	10.0U
N-NITROSOMORPHOLINE	10.0U	10.0U	10.0U	10.0U
N-NITROSOPIPERDINE	10.0U	10.0U	10.0U	10.0U
N-NITROSOPYRROLIDINE	10.0U	10.0U	10.0U	10.0U
5-NITRO-O-TOLUIDINE	10.0U	10.0U	10.0U	10.0U

TABLE 3 (CONTINUED)

BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS

APPENDIX IX SEMI-VOLATILES (CONTINUED)

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (UG/L)	12A	12B	12C	12D
PARATHION	10.0U	10.0U	10.0U	10.0U
PENTACHLOROBENZENE	10.0U	10.0U	10.0U	10.0U
PENTACHLORONITROBENZENE	50.0U	50.0U	50.0U	50.0U
PHENACETIN	10.0U	10.0U	10.0U	10.0U
PHENANTHRENE	10.0U	10.0U	10.0U	10.0U
P-PHENYLENEDIAMINE	50.0U	50.0U	50.0U	50.0U
PHORATE	10.0U	10.0U	10.0U	10.0U
2-PICOLINE	10.0U	10.0U	10.0U	10.0U
PRONAMIDE	10.0U	10.0U	10.0U	10.0U
PYRENE	10.0U	10.0U	24.6	14.2
PYRIDINE	10.0U	10.0U	10.0U	10.0U
SAFROLE	10.0U	10.0U	10.0U	10.0U
1,2,4,5-TETRACHLOROBENZENE	10.0U	10.0U	10.0U	10.0U
TETRAETHYLDITHIOPYROPHOSPHATE	10.0U	10.0U	10.0U	10.0U
THIONAZIN	10.0U	10.0U	10.0U	10.0U
O-TOLUIDINE	10.0U	10.0U	10.0U	10.0U
1,2,4-TRICHLOROBENZENE	10.0U	10.0U	42.8	51
O,O,O-TRIETHYLPHOSPHOROTHIOATE	10.0U	10.0U	10.0U	10.0U
DIBENZ(A,H)ANTHRACENE	10.0U	10.0U	10.0U	10.0U
1,3,5-TRINITROBENZENE	50.0U	50.0U	50.0U	50.0U

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RES
APPENDIX IX PESTICIDES AND HERBICIDES

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICA	PD-2 MATRIX SPI	PD-2 MATRIX SPI DUPLICATE
LABORTORY I.D. PARAMETER	**16A**	**16B**	**16C**	**16D**
ALDRIN (UG/L)	<0.40	<0.40	<0.40	<0.40
AROCLOR-1016 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1221 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1232 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1242 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1248 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1254 (UG/L)	<20.0	<20.0	<20.0	<20.0
AROCLOR-1260 (UG/L)	<20.0	<20.0	<20.0	<20.0
ALPHA-BHC (UG/L)	<0.40	<0.40	<0.40	<0.40
BETA-BHC (UG/L)	<0.40	<0.40	<0.40	<0.40
DELTA-BHC (UG/L)	<0.40	<0.40	<0.40	<0.40
GAMMA-BHC(LINDANE) (UG/L)	<0.40	<0.40	<0.40	<0.40
CHLORDANE (UG/L)	<2.0	<2.0	<2.0	<2.0
4,4'-DDD (UG/L)	<0.80	<0.80	<0.80	<0.80
4,4'-DDE (UG/L)	<0.80	<0.80	<0.80	<0.80
4,4'-DDT (UG/L)	<0.80	<0.80	<0.80	<0.80
DIELDRIN (UG/L)	<0.80	<0.80	<0.80	<0.80
ENDOSULFAN SULFATE (UG/L)	<0.80	<0.80	<0.80	<0.80
ENDOSULFAN I (UG/L)	<0.80	<0.80	<0.80	<0.80
ENDOSULFAN II (UG/L)	<0.80	<0.80	<0.80	<0.80
ENDRIN (UG/L)	<0.80	<0.80	<0.80	<0.80
ENDRIN ALDEHYDE (UG/L)	<0.80	<0.80	<0.80	<0.80
HEPTACHLOR (UG/L)	<0.40	<0.40	<0.40	<0.40
HEPTACHLOR EPOXIDE (UG/L)	<0.40	<0.40	<0.40	<0.40
METHOXYCHLOR (UG/L)	<4.0	<4.0	<4.0	<4.0
TOXAPHENE (UG/L)	<10.0	<10.0	<10.0	<10.0
2,4,5-TP SILVEX (MG/L)	<.005	<.005	<.005	<.005
2,4,5-T (MG/L)	<.005	<.005	<.005	<.005
2,4-D (MG/L)	<.025	<.025	<.025	<.025

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULT
APPENDIX IX DIOXINS AND FURANS

FIELD SAMPLE I.D	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (ng/l)	20A	20B	20D-MS	20D-MSD
2,3,7,8-TCDD	.0065U	.0031U	0.18	0.23
1,2,3,7,8-PECDD	.0250U	.0056U	0.98	1.13
1,2,3,4,7,8-HXCDD	.0150U	.0067U	0.92	1.03
1,2,3,6,7,8-HXCDD	.0150U	.0069U	1.01	1.11
1,2,3,7,8,9-HXCDD	.0180U	.013U	1.06	1.11
2,3,7,8-TCDF	0.02	.0045U	0.19	0.23
TOTAL TCDF	0.11	N/A	N/A	N/A
1,2,3,7,8-PECDF	0.016	.0041U	1.11	1.06
2,3,4,7,8-PECDF	.0096U	.0082U	0.98	1.17
TOTAL PECDF	0.04	N/A	N/A	N/A
1,2,3,4,7,8-HXCDF	.01U	.0031U	0.94	1.13
1,2,3,6,7,8-HXCDF	.0180U	.012U	1	1.07
2,3,4,6,7,8-HXCDF	.0230U	.011U	0.99	1.18
1,2,3,7,8,9-HXCDF	.0150U	.011U	1.02	1.16

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
TARGET COMPOUND LIST (TCL)
AMENABLE CYANIDE

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D. PARAMETER (MG/L)	14A	14B	14C	14D
AMENABLE CYANIDE	<0.01	<0.01	0.24	0.26

TABLE 3 (CONTINUED)
BACKGROUND GROUNDWATER SAMPLE ANALYTICAL RESULTS
TARGET COMPOUND LIST (TCL)
SULFIDE

FIELD SAMPLE I.D.	PD-2	PD-2 DUPLICATE	PD-2 MATRIX SPIKE	PD-2 MATRIX SPIKE DUPLICATE
LABORATORY I.D.	**15A**	**15B**	**15C**	**15D**
SULFIDE (MG/L)	<.4	<.4	<.4	<.4

TABLE 4
EASTERN OIL LAGOON IMPOUNDMENT
SOIL SAMPLE ANALYTICAL RESULTS
TOTAL PETROLEUM HYDROCARBONS (TPH)

FIELD SAMPLE I.D.	EI-1	EI-2	EI-3	EI-4
LABORATORY I.D.	**7A**	**8A**	**9A**	**10A**
TOTAL PETROLEUM HYDROCARBONS (MG/KG)	3500	1550	1700	4640
SAMPLE COLLECTION DEPTH BELOW GROUND SURFACE ELEVATION (FEET)	1.3 - 2.3	0.83 - 1.1	1.5 - 2	2.25 - 2.5

TABLE 5

TABLULATED FIELD DATA FOR SLUDGE VOLUME ESTIMATE

EASTERN OIL LAGOON IMPOUNDMENT

FIELD LOCATION I.D.	OBSERVED INTERVAL (FROM GROUND SURFACE ELEVATION)	SLUDGE DESCRIPTION
FA'	0-2'4"	Black, oily, soft, viscous
FB'	0-1'	Dark brown, dry with 2" thick top layer of oily material
FC'	0-1'7"	Black, soft, viscous
EA'	0-1'3"	Dark brown soil-like material with 2" thick top layer of oily sludge
EB'	0-1'5"	1'3" thick affected material with 2" thick top layer of oily sludge
EC'	0-10"	Soil-like sludge with 8" of affected soil
DC'	0-9"	Soil-like sludge with 8" of affected soil
DB'	0-1'2"	Soil-like sludge with 10" of affected soil
DA'	0-2'2"	Black, oily, soft viscous
CA'	0-1'10"	Black, oily, soft viscous
CB'	0-10"	Soil-like sludge with 4" of affected soil
CC'	0-7"	Soil-like sludge with 4" of affected soil
BA'	0-1'9"	Black, oily, soft viscous
BB'	0-7"	Dark brown soil-like material with 2" thick top layer of black oily sludge
BC'	0-2"	Dark brown soil-like material
AA'	0-9"	Dark brown soil-like material with 2" inch thick top layer of black oily sludge
AB'	0-4"	Dark brown soil-like material with 1" inch thick top layer of black oily sludge
AC'	0-3"	Dark brown soil-like material

TABLE 6
EASTERN OIL LAGOON IMPOUNDMENT
SLUDGE AND AFFECTED SOIL VOLUME ESTIMATE

ESTIMATED SLUDGE VOLUME (IN-SITU) EASTERN OIL LAGOON IMPOUNDMENT

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	SLUDGE THICKNESS (ft.)	SLUDGE VOLUME (cu. ft.)	SLUDGE VOLUME (cu. yds.)
A-A'	30x50	1,500	0.8	1,125	41.7
B-A'	50x50	2,500	1.8	4,375	162
C-A'	50x50	2,500	1.8	4583.3	169.8
D-A'	50x50	2,500	2.2	5416.7	200.6
E-A'	50x50	2,500	1.3	3,125	115.7
F-A'	30x50	1,500	2.3	3,500	129.6
			TOTAL		819.4

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	SLUDGE THICKNESS (ft.)	SLUDGE VOLUME (cu. ft.)	SLUDGE VOLUME (cu. yds.)
A-B'	30x50	1,500	0.3	500	18.5
B-B'	50x50	2,500	0.4	1041.7	38.6
C-B'	50x50	2,500	0.5	1,250	46.3
D-B'	50x50	2,500	0.3	833.3	30.9
E-B'	50x50	2,500	1.4	3541.7	131.2
F-B'	30x50	1,500	1	1,500	55.6
			TOTAL		321

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	SLUDGE THICKNESS (ft.)	SLUDGE VOLUME (cu. ft.)	SLUDGE VOLUME (cu. yds.)
A-C'	30x80	2,400	0.3	600	22.2
B-C'	50x80	4,000	0.2	666.7	24.7
C-C'	50x80	4,000	0.3	1,000	37
D-C'	50x80	4,000	0.1	333.3	12.3
E-C'	50x80	4,000	0.2	666.7	24.7
F-C'	30x80	2,400	1.6	3,800	140.7
			TOTAL		261.7

IN-SITU SLUDGE VOLUME EASTERN OIL LAGOON IMPOUNDMENT (cu. yds.) 1,402

TABLE 6 (CONTINUED)
EASTERN OIL LAGOON IMPOUNDMENT
SLUDGE AND AFFECTED SOIL VOLUME ESTIMATE

ESTIMATED AFFECTED SOIL VOLUME (IN-SITU) EASTERN OIL LAGOON IMPOUNDMENT

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	AFFECTED SOIL THICKNESS (ft.)	*AFFECTED SOIL VOLUME (cu. ft.)	*AFFECTED SOIL VOLUME (cu. yds.)
A-A'	30x50	1500	1	1,500	55.6
B-A'	50x50	2500	1	2,500	92.6
C-A'	50x50	2500	1	2,500	92.6
D-A'	50x50	2500	1	2,500	92.6
E-A'	50x50	2500	1	2,500	92.6
F-A'	30x50	1500	1	1,500	55.6
			TOTAL		481.5

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	AFFECTED SOIL THICKNESS (ft.)	*AFFECTED SOIL VOLUME (cu. ft.)	*AFFECTED SOIL VOLUME (cu. yds.)
A-B'	30x50	1500	1	1,500	55.6
B-B'	50x50	2500	1	2,500	92.6
C-B'	50x50	2500	1	2,500	92.6
D-B'	50x50	2500	1	2,500	92.6
E-B'	50x50	2500	1	2,500	92.6
F-B'	30x50	1500	1	1,500	55.6
			TOTAL		481.5

CELL	DIMENSION (ft.xft.)	AREA (sq. ft.)	AFFECTED SOIL THICKNESS (ft.)	*AFFECTED SOIL VOLUME (cu. ft.)	*AFFECTED SOIL VOLUME (cu. yds.)
A-C'	30x80	2400	1	2,400	88.9
B-C'	50x80	4000	1	4,000	148.1
C-C'	50x80	4000	1	4,000	148.1
D-C'	50x80	4000	1	4,000	148.1
E-C'	50x80	4000	1	4,000	148.1
F-C'	30x80	2400	1	2,400	88.9
EAST SIDE		31600	0.25	7,900	292.6
			TOTAL		1,063

*IN-SITU AFFECTED SOIL VOLUME EASTERN OIL LAGOON IMPOUNDMENT (cu. yds.) 2,026

*Affected soil volume estimate is based on a total petroleum hydrocarbons analysis and is considered to reflect a minimum quantity of affected soil present within the impoundment.

IN-SITU MATERIAL (SLUDGE and AFFECTED SOIL) VOLUME ESTIMATE
EASTERN OIL LAGOON IMPOUNDMENT (cu. yds.) 3,428

TABLE 7

GROUNDWATER LEVEL MEASUREMENT RESULTS

OBTAINED SEPTEMBER 27, 1994

MONITOR WELL	TIME MEASURE	TOP OF CASING ELEVATION (FEET ABOVE SEA L	DEPTH TO GROUND FROM TOP OF CASIN (FEET)	ELEVATION OF GROUNDWATER (FEET ABOVE SEA L
PD-1	11:38 AM	7.51	5.36	2.15
PD-2	10:48 AM	11.71	9.91	1.8
WL-2	11:45 AM	10.28	9.37	0.91
WL-3	11:49 AM	8.22	6.71	1.51
WL-4	12:15 PM	7.29	5.19	2.1
EL-1	12:25 PM	15.29	10.07	5.22
EL-2	12:15 PM	17.28	16.26	1.02
EL-3	12:20 PM	10.1	9.21	0.89
EL-4	12:35 PM	10.79	11.61	-0.82

TABLE 8

GROUNDWATER LEVEL MEASUREMENT RESULTS

OBTAINED OCTOBER 5, 1994

MONITOR WEL	TIME MEASUR	TOP OF CASING ELEVATION (FEET ABOVE SEA	DEPTH TO GROUND FROM TOP OF CASI (FEET)	ELEVATION OF GROUNDWATER (FEET ABOVE SEA
PD-2	9:00 AM	11.71	9.37	2.34
WL-2	9:20 AM	10.28	9.27	1.01
WL-3	9:35 AM	8.22	6.6	1.62
WL-4	9:50 AM	7.29	5.25	2.04
EL-1	10:30 AM	15.19	9.75	5.44
EL-2	11:00 AM	17.23	15.75	1.48
EL-3	11:15 AM	9.81	8.3	1.51
EL-4	11:25 AM	10.47	10.75	-.28

DRAFT

DSM ENVIRONMENTAL SERVICES, INC.

CORCO FACILITY
LOCATION OF EXISTING
MONITORING WELLS AND
PROPOSED RECOVERY WELLS

PROJECT: 1125-01	DRAWN BY: MWH	CHK'D BY:	REV:
DATE: 7/30/98	SCALE: 1"=300'	FIGURE: 1	DB NUMBER:

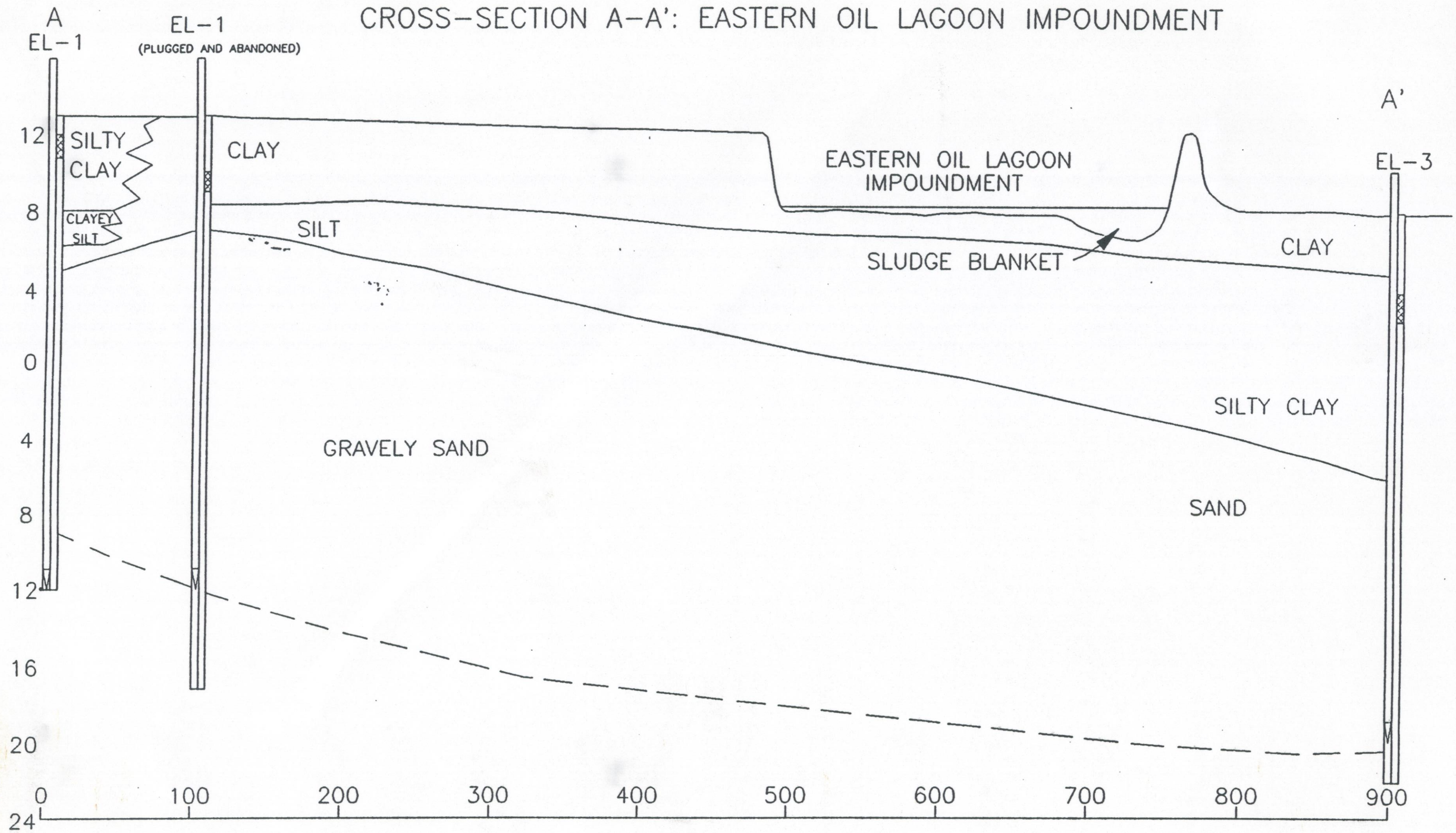
DRAFT

DSM ENVIRONMENTAL SERVICES, INC.

CORCO FACILITY
PRODUCT COLLECTION
SYSTEM LAYOUT

PROJECT: 1 25-01	DRAWN BY: MWH	CHK'D BY:	REV:
DATE: 7/30/98	SCALE: 1"=300'	FIGURE: 3	DB NUMBER:

CROSS-SECTION A-A': EASTERN OIL LAGOON IMPOUNDMENT



DSM Environmental Services, Inc.				
CROSS-SECTION A-A' EASTERN OIL LAGOON IMPOUNDMENT				
PROJECT NO. 1019-01	DRAWN BY DWM	CHK'D BY	DATE 1-27-95	REV
SCALE AS NOTED	PHASE NO.		SHEET 1 OF 1	